TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Technopolitical Resonance

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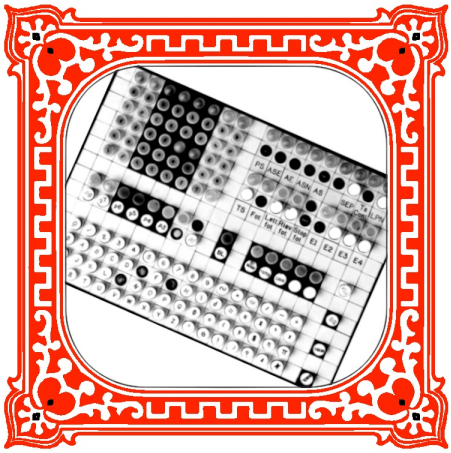
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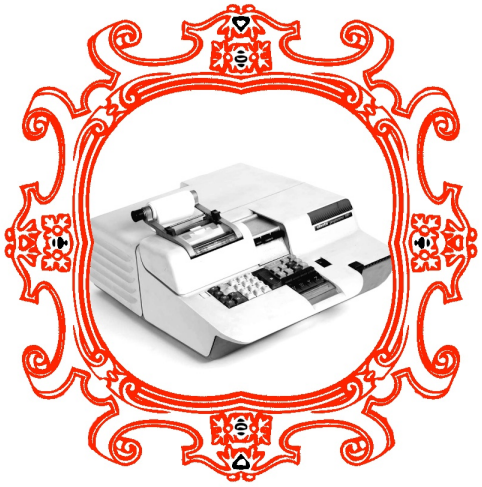




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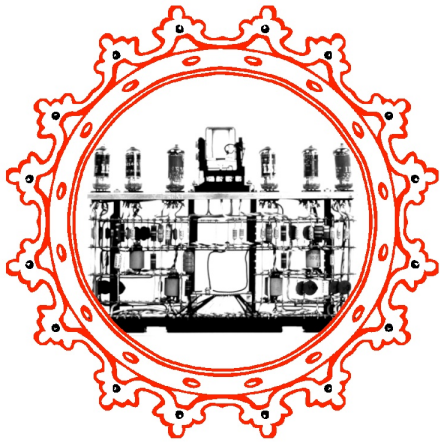
TECHNOPOLITICAL RESONANCE

Emotions, Computers and Socialism in Cold War Italy (1965-1990)













Technopolitical Resonance

Emotions, computers and socialism in Cold War Italy (1965-1990)

THESIS

ter verkrijging van de graad van doctor aan de Technische Universiteit Eindhoven, op gezag van de rector magnificus prof.dr.ir. F.P.T. Baaijens,

voor een commissie aangewezen door het College voor Promoties, in het openbaar te verdedigen op woensdag 19 oktober 2022 om 16:00 uur

door

Ginevra Sanvitale

geboren te Ortona, Italië

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Het onderzoek of ontwerp dat in dit thesis wordt beschreven is uitgevoerd in overeenstemming met de TU/e Gedragscode Wetenschapsbeoefening.

My answers are inadequate
To those demanding day and date,
And ever set a tiny shock
Through strangers asking what's o'clock;
Whose days are spent in whittling rhyme—
What's time to her, or she to Time?

Dorothy Parker, "Daylight Saving" (1928)

Abstract

Emotions and politics are often considered an hindrance to technological development. Even more, technology is promised to simplify political processes, and to overcome emotional distress. Yet, after a century of these promises, the contemporary world looks more politically complex and emotionally demanding than ever. What if we change perspective, by looking at our tech-centered world from other dimensions of human experience? In this PhD dissertation, I show that "emotions," "technology," and "politics" are always profoundly interrelated, by presenting an in depth historical investigation of the role played by emotions in the re-politicization and de-politicization of computer technologies in Cold War Italy (1965-1990). I developed a novel methodological and conceptual approach centered on the notion of "Technopolitical Resonance," to understand how emotions contributed to make specific technopolitical configurations more or less popular through history. This approach provides an actor-centered framework to investigate emotions' significance in the History of Technology, currently lacking in the field. It is based on literature from the History and Anthropology of Emotions, stressing the epistemic and performative significance of emotions. The dissertation is centered on the reproduction and the rejection of a technopolitical configuration which I call "the Black Box Entanglement". This configuration, I claim, relied on the "fear of falling behind" in the Cold War to promote computer use, and their design as "black boxes," that users could not study nor modify. The dissertation critically analyzes the diffusion of black-boxed computers as a de-politicizing design choice, because the design process includes only a limited number of actors, namely the engineers and software developers, thus reducing the space for democratic participation. The dissertation also offers a critical perspective on "fear of falling behind" as a de-politicizing discourse on the societal significance of computers, because it flattens the political debate favoring a phenomenological approach (how can technology solve our problem? -Because it certainly will) over a dialectical one (why will technology -and not something else- solve our problem?). Several re-politicizing counter-narratives are also analyzed, based on different emotions (i.e. hope, anger, pride) and different political visions on the societal significance of computers and their design.

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Preface (and acknowledgments)

How I learned to stop worrying, and love the history of technology

I am at home in Bologna, working on my doctoral project about the history of computing. My partner, a software developer, is playing a part in unfolding this history from the other room. Our house is full of computer parts, computer books, and conversations about computers. What a modern couple we are, how fit for the Computer Age! But, every now and then, our day is interrupted by a computerized voice, which neither of us has programmed. “Linea 37” it says. It comes from an automatic speaker, announcing this bus’s arrival at the stop down in the street.

Bus 37 is not like any other bus in Bologna. It is a memento, a window into a past which I have not lived, but can’t be forgotten. On August 2, 1980, bus 37 was temporarily converted into a hearse. At 10:25 that morning, a bomb exploded in Bologna’s central train station, killing 85 people and wounding hundreds. Bus 37 was used to transport the victims’ bodies to the morgue. Far from being an isolated episode, the Bologna Massacre was the most recent event in a decade-long period of bombings and other violent acts perpetrated by Neo-fascist groups, with the more or less tacit approval of the Italian secret services and armed forces. This was the so-called “Strategy of Tension,” aimed at destabilizing Italian public morale in order to shift the government to the far-right. Today, most historians agree that such a plan had no chance of success, and this was already clear to many people at the time. However, the deaths caused by these attacks were very real, and disturbing events undeniably took place during the period known as the “Italian first republic” (1948-1994).

Bus 37’s arrival has interrupted my work, so I decide to take a break and read something about the present. “Facebook broke democracy!” claim news outlets reporting on the Cambridge Analytica scandal, or some other wrongdoing by Mark Zuckerberg’s company. When 10 years ago the “Arab Spring” prompted an opposite claim, that social media could “make” democracy, a terrible delusion was around the corner. The Cambridge Analytica scandal and the Arab Spring delusion have indeed something in common: people lost sight of extremely complex societal and political processes in favor of a technology-centered, de-politicized vision. But, if it was true that a website could “break” or “make” a democracy, then perhaps our democracies were not so strong in the first place. This

would make it even more imperative to address such events from a political, not technological perspective. What if it is never technology, but always politics that makes or breaks democracies?

This dissertation is grounded in the idea that we, European scholars and citizens,[1] need to re-politicize public debates on technology, otherwise we will never be able to mend our democracies—which, if not broken, are certainly crooked. The word "politics" has acquired a negative connotation nowadays. You should not "discuss politics" at dinner parties, and take care not to look "too political" at work. But this word has been in our vocabularies for centuries, and the concept it describes has existed even longer. The fact that we don't talk about politics, won't make it disappear: only make it more difficult to understand how it works. And this is a problem for democracy, because if political processes are not based on transparency, and accountability, and participation, then perhaps we are not in a functioning democracy.

Even in settings devoted to political decision making, technology-related choices seem to lack a coherent and explicit political rationale. European Union policymakers dream of "technological sovereignty,"[2] but they also produce a "Digital Economy and Society Index"[3] which generically drives greater use of digital technologies, regardless of their provenance and software license. Things are no better when we look at grassroots political movements: recent years have seen the emergence of a transnational environmentalist movement, famously exemplified by the Fridays For Future activists, and a feminist "fourth wave" has apparently begun. However, technology-critical movements today are the Cinderella of grassroots politics, and the "fourth feminist wave" is one example: in the 1990s, the combination of feminism and technology meant cyborgs and self-managed servers, whereas now it means #hashtags on corporate-managed social media. Is this a feminist Arab Spring, or will the change last longer in this case? And I am still into "third wave" feminism: what does this make me? Am I already a #boomer,[4] in my early 30s? I start wondering, anxiously.

But bus 37 is here again, shifting my thoughts back to the past. Had the Bologna massacre happened today, there would be hundreds of pictures and videos (and hashtags) about the event. The

1 I wish to stress the reason why I only talk about "Europeans" is not ethnocentrism. I only address "Europeans" because of the geographical and cultural context I have researched, and I cannot make claims about other regions.
2 European Commission, "Europe: The Keys To Sovereignty," September 11, 2020, https://ec.europa.eu/commission/commissioners/2019-2024/breton/announcements/europe-keys-sovereignty_en. Accessed September 20, 2022.
3 European Commission, "The Digital Economy and Society Index (DESI)," 2021-2020, https://digital-strategy.ec.europa.eu/en/policies/desi.
4 https://en.wikipedia.org/wiki/OK_boomer Accessed September 20, 2022.

trials might have been over in a few years, with all the additional evidence available on Instagram. Perhaps my fourth wave feminist sisters are right, I am a #boomer. Maybe I should learn to stop worrying, and start loving Mark Zuckerberg.

No, I should not. Because if there is something that all generations of feminists have in common is a unique emotional attitude, described by Sara Ahmed in her "Killjoy Manifesto."[5] And this attitude is not exclusive to feminists: every individual wishing to engage critically with societal and political issues must be prepared to cause some degree of joy-killing. During my research, I encountered many killjoys. They critically examined "this circularity of illusions-delusions which follows each technological cycle, probably from the wheel to the steam machine, electricity, and automation."[6] Killjoys who challenged the idea that a computer could "make" or "break" democracy, and therefore debated how to use this technology without falling for yet another "depressingly uninspiring"[7] utopian (or dystopian) plan. Killjoys who knew very well that the Computer Age was the same "Age" when bombs exploded inside train stations, and bus 37 became a hearse. At times, I even felt overwhelmed by my sources: historical actors knew much more than me, about both politics and technology. Despite being so knowledgeable, they failed to produce a long-lasting re-politicization of computer debates: what made me think I could be more successful?

While entangled in this unsolvable question, I also learned one certainty, as the Killjoy Manifesto's 5th principle states: "I am not willing to get over histories that are not over." There is a political and emotional history of the Computer Age which is certainly not over. It is a fragmented history, because the actors who made it were at times in conflict with each other. But it is also a contiguous history: these actors often had the same feelings and the same thoughts about computers' political significance. It is a Resonant history, as I call it in this dissertation. Recomposing this history, looking at emotions as a shared space of understanding, is what I can add to the knowledgeable debates and analysis of the past.

No, Facebook did not break democracy, and it won't fix it. Forgetting is what broke democracy. And politics is what can fix it. Today we have many expectations about digital technologies, but sometimes we find comfort in these expectations to avoid tackling difficult and uncomfortable political issues. The road to the re-politicization of computer debates seems long and impervious,

5 Sara Ahmed, *Living a Feminist Life* (Duke University Press, 2017), 251-268.

6 "[…] Questa circolaritá di illusioni-delusioni che è seguita ad ogni ciclo tecnologico, probabilmente dalla ruota, fino alla macchina a vapore, all'elettricitá, all'automazione" Giovanni Berlinguer, *Informatica, Economia, Democrazia* (Editori Riuniti, 1973), 208.

7 Marie-Louise Berneri, *Journey Through Utopia*, (Routledge and Kegan Paul, 1950).

however we already have the intellectual and practical tools to aid us with this process. This is why I learned to stop worrying, and start loving the history of technology.

***

Whereas learning how to love the history of technology was a very enjoyable process, I often wondered whether the history of technology would love me back, and this has been a frequent source of methodological anxieties and theoretical conundrums. I started this PhD project as a trained anthropologist. This proved to be an asset because I was drawn to actors and sources that are currently under-represented in the history of computing. But I frequently asked myself how the personal engagement required in anthropology could be reconciled with the distancing from historical actors often required by historiography. I am thus very grateful for the support and the encouragement I have received from my PhD promotor Erik van der Vleuten, my supervisor and initiator of the "Fearful technologies" project Karena Kalmbach, and my co-supervisor, Andreas Spahn. They provided stimulating questions and insights, while leaving me free to explore my own path and interests. I could not have asked for better mentors. Doctoral committee members Paul Edwards, Anna Guagnini, Ruth Oldenziel, and Valérie Schafer provided constructive and critical comments which greatly improved this manuscript.

My first encounters with the research field happened during my years as a master student at the University of Bologna: I will always be grateful to Anna Guagnini and Giuliano Pancaldi, for introducing me to the fascinating world of the History of Science and Technology. The History Lab at Eindhoven University of Technology did the rest, providing engaging conversations and perspectives. I would like to thank Ruth Oldenziel, Mila Davis, Frank Veraart, Harry Lintsen, Eric Berkers, Jonas van der Straeten and Jan Korsten for the History Lab reading seminars (as well as the coffee breaks), and for their insights in studying, researching, and teaching the History of Technology. Through the Eindhoven History Lab I had the opportunity to discuss my work with colleagues who offered valuable comments on my drafts and research plans: Dick van Lente, Peter Norton, Arwen Mohun, Frank Schipper. A special mention to my PhD colleagues in the History Lab, Patrick Bek and Henk-Jan Dekker, with whom I shared the incredible adventure that is achieving a PhD (and during a pandemic!). Patrick's intellectual insights and emotional support have been particularly important in the final months, when it seemed the project would never end.

During my PhD project, I also had the opportunity to attend workshops, summer schools, and conferences. Three of these were particularly important for shaping this dissertation and I am indebted to the organizers and participants. I am particularly grateful to Martina Hessler and Bettina Hitzler for the workshop “The Multifacted Relationship between Fear and Technology,” held at the Max Planck Institute for Human Development in October 2018, and the resulting publication; to Valérie Schafer and Paul Edwards for the insights gained at the Tensions of Europe summer school “Towards Digital Science and Technology Studies: Challenges and Opportunities,” held at the Centre for Contemporary and Digital History (C²DH) at the University of Luxembourg in June 2019; to Aristotle Tympas for the Tensions of Europe workshop “Computing, Artificial Intelligence, Big Data, Algorithms, Internet of Things, Social Media, Automation, Robotics and Cybernetics: Historical and STS Perspectives from Mediterranean/Southern/Southeastern Europe,” held online in June 2021, as well as our conversations on the history of computing. I would also like to thank Anna Åberg, Andreas Marklund, Anique Hommels (and again Karena Kalmbach) for the panels on technology and crises we organized during Tensions of Europe conferences.

Not only historians helped to shape my work. The Technology, Innovation and Society group at Eindhoven University of Technology provided a welcoming and stimulating environment during my PhD studies. The Thursday seminars offered very valuable interdisciplinary exchanges, as did the many informal gatherings with PhD and postdoc colleagues at TU/e. I am especially indebted to Ankit, Darja, Edgar, Matthew, Minha, Tanja and our visiting colleagues from abroad, Aske and Michal. My pre-doctoral years have been equally important for this dissertation. Professor Davide Domenici was the first to show me there was an incredibly fascinating world beyond the *histoire événementielle* I had been studying before taking his classes. This is the first dissertation I have written without his supervision. Other fundamental learning came from classes by Ivo Quaranta (Cultural and Medical Anthropology), Luca Jourdan (Social and Political Anthropology), Cristiana Natali and Gateano Mangiameli (Research Methodology).

Furthermore, I would like to express my deep gratitude to the people and institutions who provided oral accounts and source materials for this dissertation. Paola Manacorda, Fiorella De Cindio, Filippo Demonte, IBM labor unionists Francesco Fiaccadori, Alfio Riboni, Giovanni Talpone, Valeria Bernardi and Renato Pomari, all graciously agreed to be interviewed, sharing precious information on Italy’s history of computing. I am grateful to the many archivists and cultural institutions that provided materials: staff at Archivio Gramsci Emilia-Romagna; Archivio RSU IBM; Centro di documentazione dei movimenti “F. Lorusso – C. Giuliani”; Centro Studi Libertari –

Archivio Giuseppe Pinelli; Archivio Grafton9; Biblioteca Libertaria Armando Borghi; Biblioteca “Elio Xerri” – Circolo Anarchico “C. Berneri.” Deserving a special mention is Nicola, at Centro Lorusso – Giuliani, whose captivating enthusiasm and commitment made it very difficult to move on to a different archive.

A researcher’s life is not only about doing research. Writing about your research is an equally fundamental task. It would be much more difficult for you to understand this manuscript if it wasn’t for the amazing editing work done by Val Kidd. I am also indebted to Anne Schuler, who introduced me to English academic writing. TIS secretariat support was fundamental to avoid succumbing to the intricacies of university regulations: thank you Letty Calame, Sonia Parker, and Iris Houx for your support and your patience.

There is one emotion that most researchers share: a love of knowledge. I had the privilege to meet many people who encouraged and nurtured my love of knowledge. I would like to acknowledge, and honor some of those who saw the beginning of this research project but not its end. Professor Maria Maddalena Mené introduced me to Natalia Ginzburg and to cultural geography (I now realize this was the first step toward my anthropology degree). Professor Lucio Carugno taught me how to find the beauty and relevance of literary texts from the past. My uncle, professor Mario Bressan, did not succeed in turning my love for science into a chemistry degree, but he might have found some resonance in this PhD dissertation and I would have loved to discuss it with him. My grandmother, Gloria Papa, an expert in literature and an excellent writer: she would have been a great PhD candidate, if she had had the opportunity. My mother, Fabrizia Arduini, who always found time to take me to the public library as a kid, and loved this research project.

Last but not least, I am deeply indebted to my family and friends, for their enduring patience, love, and encouragement. My family gave me great support over these years, especially my father, Alberto Sanvitale, my aunts, Alessandra and Sylvia Arduini, my cousin Elena Caputi, my “fairy godmothers” Annamaria Properzi, Laura Florani and Stefania De Carlo. Gaia, Giacomo, Giorgia, Margherita, Marta: you are “my people,” as Dr. Cristina Yang would say. Thank you for being such amazing human beings and friends. Barbara, Cristina, Noemi: our conversations on technology, politics, and feminism nurtured my intellectual life, as much as our friendship nurtured my days. Andrea, Mirna, Mauro, Nicola (and the other players mentioned here): thank you for our amazing Dungeons&Dragons adventures. With you I learned how it feels to have a class enemy and what can be achieved with the right party. About my real-life political education, there are too many

people I should be thanking: from Pavia to Bologna, from the Wikiverse to the Fediverse, I have learned and grown a lot thanks to you—and hopefully helped to bring about some societal change in the process. Finally, my partner Cek, software developer, but also my sci-fi literature advisor and technical consultant. We went from a long-distance relationship to being stuck in the same apartment together during lockdown. I could imagine no better person by my side in these beautiful but also difficult years. Thank you for enduring my 24/7 listening to Italian political songs or Blondie, and for making sure I always had my morning coffee.

Introduction
Technopolitical Resonance.
Emotions, technology and politics in Cold War Italy

1. Between the Computer Age, the Age of Anxiety and the Age of Extremes: why studying emotions in the history of technology matters

The 20th century has been described in many ways: the revolutionary "Computer Age,"[8] the fearful "Age of Anxiety,"[9] the ideological "Age of Extremes."[10] Each of these characterizations is meaningful, and describes a fundamental historical path in a very complex and rapidly changing epoch. But equally fundamental are the intersections of these three "ages," particularly when they contradict each other's promises. For example, Western Europe and North America are among the most technologically advanced and most anxious regions in the world.[11] And the increased availability of information and communication technologies has not prevented the resurgence and strengthening of old-fashioned, yet dangerous ideologies.[12] Certainly, every historical period has its

8 According to Michael S. Mahoney in "The Histories of Computing(s)," *Interdisciplinary Science Reviews* 30, no. 2 (2005): 119–35), the term "computer revolution" was "announced" in Edmund Berkeley's 1962 book "The Computer Revolution." However, the term was already used in the 1950s. See: Richard L. Waddell, "Communications: Pushbutton Control," *Challenge* 4, no. 11–12 (1956): 11–15; Richard A. Musgrave and Alan T. Peacock, eds., *Classics in the Theory of Public Finance* (Springer, 1958).

9 See: Peter N. Stearns, "Fear and History," *Historein* 8 (2008); "Fear and Contemporary History: A Review Essay," *Journal of Social History* 40, no. 2 (2006): 477–84; David Harry Bennett, *The Party of Fear: From Nativist Movements to the New Right in American History* (UNC Press Books, 1988); Frank Füredi, *Culture of Fear Revisited: Risk-Taking and the Morality of Low Expectation*, 4th ed. (Continuum, 2006); Joanna Bourke, *Fear: A Cultural History* (Counterpoint Press, 2005); Michael Laffan and Max Weiss, *Facing Fear: The History of an Emotion in Global Perspective*, vol. 4 (Princeton University Press, 2012); The relationship between technological development and fear is mostly analyzed in nuclear history: Spencer R. Weart, *Nuclear Fear: A History of Images* (Harvard University Press, 2009); *The Rise of Nuclear Fear* (Harvard University Press, 2012).

10 Eric J. Hobsbawm, *The Age of Extremes: The Short Twentieth Century, 1914-1991* (Abacus, 2011).

11 See: Ronald C. Kessler et al., "The Global Burden of Mental Disorders: An Update from the WHO World Mental Health (WMH) Surveys," *Epidemiology and Psychiatric Sciences* 18, no. 1 (2009): 23–33; Amanda J. Baxter et al., "Global Prevalence of Anxiety Disorders: A Systematic Review and Meta-Regression," *Psychological Medicine* 43, no. 5 (2013): 897–910. In other studies, this prevalence is not so evident, but more than the raw data (difficult to compare across countries, see: Arthur Kleinman and Byron Good, *Culture and Depression: Studies in the Anthropology and Cross-Cultural Psychiatry of Affect and Disorder,* Univ of California Press, 1985), it is interesting to notice how anxiety and depression have become fundamental clinical categories particularly in North America and Europe. Whether people there are more anxious and depressed, they perceive these as key societal problems. See: Amanda J. Baxter et al., "Challenging the Myth of an 'Epidemic' of Common Mental Disorders: Trends in the Global Prevalence of Anxiety and Depression between 1990 and 2010," *Depression and Anxiety* 31, no. 6 (2014): 506–16; Alain Ehrenberg, *The Weariness of the Self: Diagnosing the History of Depression in the Contemporary Age* (Montreal: McGill-Queen's University Press, 2010).

12 On Italian neo-fascists movements, see: Maddalena Gretel Cammelli, "The Legacy of Fascism in the Present: 'Third Millennium Fascists' in Italy," *Journal of Modern Italian Studies* 23, no. 2 (2018): 199–214; "Fascism as a Style of Life: Community Life and Violence in a Neofascist Movement in Italy," *Focaal* 2017, no. 79 (2017): 89–101; *Fascisti Del Terzo Millennio: Per Un'antropologia Di CasaPound* (Ombre Corte, 2015). On neo-fascist and neo-Nazi use of technology, see: Emmi Bevensee and Alexander Reid Ross, "The Alt-Right and Global Information Warfare," in *IEEE International Conference on Big Data* (IEEE, 2018), 4393–4402; Emmi Bevensee and Rebellious Data LLC, "The Decentralized Web of Hate," 2020, https://rebelliousdata.com/p2p/.

own idiosyncrasies, but exactly for this reason they should be scrutinized. As Karena Kalmbach argues, if widespread and rapid technological development is a key pillar of "modernity," and if "fear" was a crucial emotion in the 20th century, then their entanglement should not be overlooked.[13] Reflecting on the specific interaction between emotions, technology, and politics is of paramount importance today: the Covid-19 pandemic accelerated the use of digital technologies, but also highlighted political and societal issues which technology cannot solve. In this dissertation I would like to encourage such reflection, starting with three crucial tensions at the intersections of the Computer Age, the Age of Anxiety, and the Age of Extremes.

The first tension reveals the complex, and at times mutually reinforcing relationship between the Computer Age and the Age of Anxiety: notwithstanding their framing as empowering machines, computers have also been promoted through fear. For example, the use of fear appeals[14] in cybersecurity is not only documented, but also highlighted as a successful strategy to promote the adoption of intended technologies and behaviors.[15] In recent times, scholars have identified new "digital fears," such as "Fear of Missing Out" (FOMO). This is the fear of "missing out" on something if not constantly connected to online social platforms. As with fear appeals in cybersecurity, FOMO is promoted as a successful marketing strategy.[16] Furthermore, these fears can also be embedded in computer technology design. One example is "gamification" in social networks. Gamification strategies aim to keep users engaged as much as possible with the platform, which can increase FOMO.[17] Users, however, are generally not allowed to fully control the gamification levels on online platforms.[18]

13 Karena Kalmbach, "Fear and Technology in Modern Europe," in *Anxiety Cultures* (Johns Hopkins University Press, forthcoming).

14 "Fear appeals" refer to using fear as motivation to make someone perform a certain action, for example "fear of computer attacks" to promote the purchase of antivirus software.

15 Allen C. Johnston and Merrill Warkentin, "Fear Appeals and Information Security Behaviors: An Empirical Study," *MIS Quarterly* 3, no. 1 (2010): 549–66; Scott R. Boss et al., "What Do Systems Users Have to Fear? Using Fear Appeals to Engender Threats and Fear That Motivate Protective Security Behaviors," *MIS Quarterly* 39, no. 4 (2015): 837–64.

16 Chris Hodkinson, "'Fear of Missing Out'(FOMO) Marketing Appeals: A Conceptual Model," *Journal of Marketing Communications* 25, no. 1 (2019): 65–88.

17 Some FOMO-inducing design elements can also be considered gamification: Aarif Alutaybi et al., "How Can Social Networks Design Trigger Fear of Missing Out?" in *IEEE International Conference on Systems, Man and Cybernetics* (IEEE, 2019), 3758–65.

18 For example, as of January 2022, it is not possible to change your Facebook timeline to show contents in chronological order, instead of which posts received more interactions (https://www.facebook.com/help/1155510281178725/ Accessed September 20, 2022.). On the use of psychology on Facebook: Ippolita, *The Facebook Aquarium: The Resistible Rise of Anarcho-Capitalism* (Institute of Network Cultures, 2015).

A second tension relates to the relationship between the Computer Age and the Age of Extremes. This tension is visible in the macro-politics of technology, that is, the grand narratives and visions for the current and future societal implications of computers.[19] After half a century of tumultuous political revolutions, from the 1950s, the Computer Age was presented as a new "revolutionary" era, which could transcend ideological, political, and societal conflict and bring widespread wealth and progress to everyone. But large and small political revolutions kept happening throughout the century, from Cuba to Kurdistan, regardless of the Computer Revolution. And computers can have very different societal and political implications, depending on "who," for "whom," and "why" they are designed and used. These differences point to fundamental political issues, which are overshadowed when computers are described as universally beneficial "revolutionary" machines. The Computer Age's promises are deeply informed by the Age of Extremes' promises. In fact, from a societal and political perspective, the "computer revolution" has been conservative in its representation of computers and computer users.[20] At the same time, this conservative narrative has also been contested and subverted in ways not intended by its initiators.[21]

The third tension unfolds within the Computer Age, and relates to the micro-politics of technology, which is, who gets access to design processes, and how their vision of social order informs these processes.[22] Computers are often presented as freedom-enhancing technologies and tools which can be tailored to individual needs and preferences. However, the field of computer production and design has always been centralized and monopolistic. The 20th century was the reign of "IBM and the seven dwarfs": Burroughs, Sperry Rand, Control Data, Honeywell, General Electric, RCA, and NCR. Today is the age of the so-called "GMAFIA": Google, Microsoft, Amazon, Facebook, IBM, Apple. The technologies they produce are based on closed hardware and software, which makes it difficult—if not impossible—to understand how they actually work, and modify their features according to user needs and preferences. In other words, they are "black boxes": only the input and the output are visible, but users have no knowledge or control of what happens in between. Furthermore, both engineering and computer science have been "exclusive" professions, most

19 On the concepts "macro-politics" and "micro-politics" in technology development: Sophie-Charlotte Fischer and Andreas Wenger, "Artificial Intelligence, Forward-Looking Governance and the Future of Security," *Swiss Political Science Review* 27, no. 1 (2021): 170–79.

20 Jean P. Kelly, "Not so Revolutionary after All: The Role of Reinforcing Frames in US Magazine Discourse about Microcomputers," *New Media & Society* 11, no. 1–2 (2009): 31–52; Marie Hicks, "Only the Clothes Changed: Women Operators in British Computing and Advertising, 1950–1970," *IEEE Annals of the History of Computing* 32, no. 4 (2010): 5–17.

21 Gerard Alberts and Ruth Oldenziel, *Hacking Europe: From Computer Cultures to Demoscenes* (Springer, 2014).

22 On the concept of technology "micro-politics" see: Fischer and Wenger, "Artificial Intelligence." Also: Cornelis Disco and Erik van der Vleuten, "The Politics of Wet System Building: Balancing Interests in Dutch Water Management from the Middle Ages to the Present," *Knowledge, Technology & Policy* 14, no. 4 (2002): 21–40.

famously from a gender perspective.[23] This aspect further heightens the tension between the promises of a universally beneficial machine and the reality of a black boxed technology, designed by a very homogeneous societal group.

These three tensions cannot be resolved just by focusing on the Computer Age and ignoring the Age of Anxiety and the Age of Extremes. Yet, policymakers give unquestioned credibility and visibility to engineers' claim that technological innovation is the best way to solve the "Grand Challenges" currently facing humanity.[24] In this way, politics is increasingly removed from public debates on the societal significance and design of technology. As observed by Erik van der Vleuten, the Grand Challenges' "well-intended yet self-interested discourse is also problematic, because it tends to monopolize the problem definition and solution, silencing alternatives, and ignoring the politics of technology and knowledge."[25] The promises made by "Grand Challenges" engineers are certainly comforting, but they do not address the Computer Age's political and emotional tensions. I argue that contemporary societal challenges should also be addressed through a political re-signification, which is a re-politicization of public debates on technology. And a better understanding of emotions' role in these debates can be a key entry point for their re-politicization.

I aim to contribute to this understanding by investigating the historical role of emotions, and fear in particular, in the de-politicization and re-politicization of public debates on computers' societal significance and design. I do so by addressing two main research questions: 1) which fearful narratives were involved in public debates on the societal significance and design of computers? 2) how did these narratives de-politicize and re-politicize debates?

To answer my research questions, I am especially interested in the use of fear to promote computers, rather than in the "fear of computers." Historians of technology have noted that fear can also be a driver of technological development, not just a consequence of introducing new technologies.[26] This shift from the classic "fear of technology" to what Karena Kalmbach calls "technology by fear" can provide crucial insights in the history of computing.[27] Most of the classic

23 Marie Hicks, *Programmed Inequalities* (MIT Press, 2017). Ruth Oldenziel, *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945* (Amsterdam University Press, 1999).

24 See the "Digital Economy and Society Index" (DESI) 2021, https://digital-strategy.ec.europa.eu/en/policies/desi.

25 Erik Van der Vleuten, "History and Technology in an Age of" Grand Challenges": Raising Questions," *Technology and Culture* 61, no. 1 (2020): 260–71.

26 Karena Kalmbach, Andreas Marklund, and Anna Åberg, "Crises and Technological Futures: Experiences, Emotion, and Action," *Technology and Culture* 61, no. 1 (2020): 272–81; Erik van der Vleuten et al., "Europe's Critical Infrastructure and Its Vulnerabilities—Promises, Problems, Paradoxes," in *The Making of Europe's Critical Infrastructure* (Springer, 2013), 3–19.

27 Kalmbach, "Fear and Technology in Modern Europe."

"fears of computers" can be framed within larger historical and societal processes resulting from technological development. Fears of job loss, fears of dehumanization and depersonalization, fears of authoritarian control, either preceded computers' commercialization or were a wider criticism of large-scale automation. Furthermore, these fears were typically a reaction to the *projected* consequences of computer use: they were often justified on a hypothetical level, but not always realized in practice. At times, the very same existence, or prevalence, of these fears was a projection.[28] Focusing on the fears used to promote computers can provide a more case-specific perspective, grounded not only in the envisioned implications of the technology but also on its actual design.

My investigation centers on how "Fear of Falling Behind" fostered the transnational diffusion of computers as "black boxes," under the threat of "falling behind" the technologically advanced capitalist society brought about by the upcoming Computer Age. I call this process the "Black Box Entanglement." The use of Fear of Falling Behind in the history of computing is an example of "technology by fear," where the "technology" is often a "black-boxed computer." I first identified the relevance of this fear in the early stage of my research project.[29] After paying further attention to the materiality of technology, I developed the notion of "Black Box Entanglement" to highlight the implications of fear of falling behind for computer design. As I show through this dissertation, the relationship between fear and black-boxed computers is a crucial one in the history of computing, which extends to the present day. A contemporary example of the Black Box Entanglement is Microsoft's use of "Fear, Uncertainty and Doubt" tactics to discredit Free and Open Source Software.[30]

I look at the historical role of Fear of Falling Behind in the de/re-politicization of computer debates by applying a novel methodological approach centered on the notion "Technopolitical Resonance," where the term "Resonance" is informed by anthropologist Unni Wikan's work.[31] The concept "Technopolitical Resonance" stresses the significance of emotions in transmitting technological and political visions. It underlines how specific technopolitical configurations became more or less

28 See chapter 1.

29 Ginevra Sanvitale, "Fear of Falling Behind and the Medicalization of Computer Attitudes in Cold War USA (1960s–1980s)," Technikgeschichte 86, no. 3 (2019): 227–44.

30 Bryan Pfaffenberger, "The Rhetoric of Dread: Fear, Uncertainty, and Doubt (FUD) in Information Technology Marketing," *Knowledge, Technology & Policy* 13, no. 3 (2000): 78–92. (See this dissertation's conclusion).

31 Unni Wikan, *Managing Turbulent Hearts: A Balinese Formula for Living* (University of Chicago Press, 1990); "Toward an Experience-near Anthropology," *Cultural Anthropology* 6, no. 3 (1991): 285–305. "Beyond the Words: The Power of Resonance," *American Ethnologist* 19, no. 3 (1992): 460–82; *Resonance: Beyond the Words* (University of Chicago Press, 2013).

popular throughout history. From this perspective, the question is whether or not historical actors established Technopolitical Resonance on the basis of Fear of Falling Behind, and whether this produced a de-politicization or re-politicization of computer debates and design by these actors.

The Italian context is a particularly fruitful site to investigate my research questions, because of the variety of political debates taking place during the Cold War. These debates, particularly those connected to the local socialist tradition, are also linked to threads in Italy's history of computing. Italy has an established and thriving left-wing hacking tradition,[32] historically linked to its long-standing left-libertarian traditions. Furthermore, the Italian Communist Party was the major institutional political force engaging in public debates on computers. It was also the largest communist party in the Western bloc and the one most openly critical of the Soviet Union. Finally, Italy also had its own computer company, Olivetti, which despite its troubled history,[33] was recognized both nationally and internationally as a pioneer. Its most famous CEO, Adriano Olivetti, is also known for his engagement with liberal-socialist politics.

Before inviting my readers into the emotional world of computer debates and socialist politics in Cold War Italy, I further discuss the two main concepts guiding my analysis. I start by explaining "Technopolitical Resonance" through literature in the History and Anthropology of Emotions, and discuss the concept's relevance for scholarship on emotions' role in the History of Technology. Section 3 provides a more articulated definition of "Black Box Entanglement," linked to the "Tech-fear" concept outlined by Martina Heßler and Bettina Hitzer.[34] In section 4, I take a critical look at how the "black box" has been framed in the History of Computing and Science and Technology Studies, in order to illustrate its significance for historical processes of de-politicization and re-politicization of computer debates and design. The operative steps to investigate "Technopolitical Resonance" are outlined in section 5. Readers will finally encounter Cold War Italian socialists, and their computer debates, through a dissertation outline in section 6. Sections 7 and 8 further clarify my research methodology with a detailed explanation of my empirical work.

32 Maxigas, "Hacklabs and Hackerspaces: Tracing Two Genealogies," *Journal of Peer Production*, no. 2 (2012).

33 The Olivetti Electronic Division was sold to General Electric and Honeywell in the 1960s, and Olivetti only produced computers again in the 1980s.

34 Martina Heßler and Bettina Hitzer, "Tech-Fear. Histories of a Multifaceted Relationship," *TG Technikgeschichte* 86, no. 3 (2019): 185–200. In: Gall, Alexander, Martina Heßler, Bettina Hitzer, Karena Kalmbach, Anne Schmidt, and Andreas Spahn. "Tech-fear" (special issue), Technikgeschichte 86, no. 3 (2019).

2. Technopolitical Resonance: between History and Anthropology

Looking at the significance of emotions in technopolitical discourses through the lens of Resonance means paying specific attention to the situatedness and the effects of these emotions. This perspective, common in the history and anthropology of emotions,[35] frames emotions not just as individualized reactions to external stimuli, but as social and cultural constructs which have both an epistemic value and a performative effect.

A key understanding is that people's emotional reactions to technology must be taken seriously, and should not be addressed as nuisances to overcome, but as pointers to wider societal issues and needs.[36] This aspect is important because in public computer debates, "fear" is often described as a "negative" emotion, which should be overcome and substituted with more "positive" feelings. Humans also tend to attach a further connotation to emotions: not just positive or negative, but also "rational" or "irrational."[37] The most extreme version of this categorization sees emotions as generally "irrational," creating a false dichotomy between "reason" and "emotions." However, the anthropology of emotions shows that emotions *per se* do not have an inherent positive or negative value. The same emotion can be considered "negative" or "positive" in different socio-cultural contexts, and in different situations.

The concept "Resonance," as developed by Unni Wikan, exemplifies emotions' epistemic value, and provides a vocabulary to evidence it. Wikan's elaboration on "Resonance" is based on the fundamental notion of what she calls "feeling-thinking," the idea that feelings and thoughts are

35 See: Catherine Lutz and Geoffrey M. White, "The Anthropology of Emotions," *Annual Review of Anthropology* 15 (1986): 405–36; Catherine Lutz and Lila Ed Abu-Lughod, *Language and the Politics of Emotion.* (Editions de la Maison des Sciences de l'Homme, 1990); Nancy Scheper-Hughes and Margaret M. Lock, "The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology," *Medical Anthropology Quarterly* 1, no. 1 (March 1987): 6–41. On the history of emotions: Monique Scheer, "Are Emotions a Kind of Practice (and Is That What Makes Them Have a History)? A Bourdieuian Approach to Understanding Emotion," *History and Theory* 51, no. 2 (May 2012): 193–220; Jan Plamper, *The History of Emotions: An Introduction* (Oxford University Press, 2015); William M. Reddy, *The Navigation of Feeling: A Framework for the History of Emotions* (Cambridge University Press, 2001).

36 This assumption should not lead to extreme "emotional relativism": understanding emotions does not mean justifying them no matter what. Emotions can have detrimental societal consequences, for example xenophobia leading to racism, thus sometimes it is important to understand emotions in order to change them.

37 Fear of a nuclear accident is regulated as a "negative" and "irrational" belief by pro-nuclear activists. But anti-nuclear activists tell an opposite story: it is completely "rational" to fear the consequences and uncertainties related to nuclear energy, and "positive" if people feel this way. The same actor might approach similar fears in completely different ways. Cold War US governments fostered the idea that it was "positive/rational" to worry about destruction from nuclear war, yet depicted fearing the consequences of a nuclear accident in local nuclear power plants as "negative/irrational."

always part of the same epistemic process. “Feeling-thinking” is Wikan’s translation of the Balinese concept “keneh.” Wikan developed her understanding of “Resonance” in Bali, while looking for a “theory of translation” that would allow her to understand local culture, then share her understanding with non-Balinese readers of her book. Wikan’s Balinese collaborators pointed out that “Resonance” was the crucial element in this process: she needed to establish Resonance with them, and then translate this Resonance into her work, so that Wikan’s readers could also establish Resonance with the Balinese. In the words of a Balinese “professor-poet,”[38] and Wikan’s collaborator: “[Resonance] is what fosters empathy or compassion. Without resonance there can be no understanding, no appreciation. But resonance requires you to apply feeling as well as thought. Indeed, feeling is the more essential, for without feeling we'll remain entangled in illusion.”[39] In other words, Resonance can be intuitively defined as a connection between two (or more) people, based on their ability to understand each other’s “feeling-thoughts.”[40] Wikan states, “Resonance evokes shared human experience, what people across space and time have in common.”[41]

I use the concept “Resonance” in three ways. One, Resonance is a connection occurring between historical actors, a phenomenon which I investigate (Technopolitical Resonance). Two, Resonance is a research methodology to examine past feeling-thoughts on computers, which involves my own connection as a researcher with the historical actors, as I discuss in section 5 (I call this Resonance-methodology). Three, Resonance is a connection which I would like to encourage between historical actors and the readers of my work, as I discuss in the epilogue (Resonance-empathy). The second and third ways come directly from Wikan. The first draws on Wikan’s notion of Resonance and adds my own elaboration.

Investigating “Technopolitical Resonance” as a phenomenon involves looking for a connection between actors. The term “Technopolitical” means that this connection has a technology-related political significance. “Resonance” means that this connection is based on both feeling and thinking. However, Wikan developed the concept Resonance based on the synchronic interaction characterizing anthropological research: she learned about the actors’ feeling-thoughts while being physically present among them. I am interested in exploring the concept Resonance from a

38 Wikan’s words.
39 Unni Wikan, “Beyond the Words.”
40 To explain “Resonance”: various social and political actors claim to be committed to addressing environmental and climate crisis issues. However, there is no resonance among all these actors—they might say similar things, but they have different emotions regarding the problem and its solution. Thus, in order to establish resonance with Greta Thunberg, you should also be able to feel her anger and disillusionment.
41 Wikan, “Beyond the Words.” 476.

diachronic perspective, using it to investigate past feeling-thought and their circulation in relation to the political significance of computers.

This mismatch can be overcome by centering the analysis on emotions' performative effect, which is observable from a historiography perspective. The different ways emotions can perform social and cultural norms is well exemplified by the notion "emotion-as-practice" developed by Monique Scheer.[42] Drawing on the history and anthropology of emotions, Scheer provided a framework to examine the history of emotions from Pierre Bourdieu's "practice theory" perspective.[43] According to Scheer, "Methodologically, a history of emotions inspired by practice theory entails thinking harder about what people are doing, and working out the specific situatedness of these doings."[44] She identified four overlapping categories of emotional practices, that I use throughout this dissertation: "mobilizing emotional practices," to foster new emotions or change or remove existing ones; "naming emotional practices," performed when emotions are given specific names and therefore become institutionalized; "communicating emotional practices," related to the somatic or verbal manifestation of emotions; and "regulating emotional practices," including norms and expectations of what are the correct emotions in different situations. In this dissertation, therefore, I use emotional practices to observe past feeling-thoughts: emotional practices are how actors performed their feeling-thoughts. Thus, if the same emotional practices are performed by different sets of actors, then there is Resonance between the actors.

Focusing on emotions' performative effect also highlights their political significance. The public performance of emotions can be a deeply political act, as observed since the earliest works on the anthropology of emotions.[45] Emotional practices can also therefore be political practices. Sara Ahmed discussed the political significance of emotions in her seminal work the "Cultural Politics of Emotions."[46] She observed how "Fear might be concerned with the preservation not simply of 'me,' but also 'us,' or 'what is,' or 'life as we know it,' or even 'life itself.'"[47] The notion of "life as we know it" always entails a specific "we" and is never a universal concept. Ahmed also observed that fear can work as a "technology of governance," because "the sovereign power either uses fear to make others consent to that power, or civil society promises protection, and the elimination of fear,

42 Scheer, "Are Emotions a Kind of Practice?"
43 Pierre Bourdieu, *Outline of a Theory of Practice* (Cambridge University Press, 1977).
44 Scheer, "Are Emotions a Kind of Practice?" 217.
45 See again works by Lutz and Scheper-Hughes and Lock.
46 Sarah Ahmed, *The Cultural Politics of Emotion*, 2nd ed, (Edinburgh University Press, 2014).
47 Ahmed. 65.

to ensure consent."[48] Therefore, I speak of "technopolitical feeling-thought" with the understanding that emotional practices can promote and normalize political visions of what society and technology should look like.

Works by Wikan, Scheer, and Ahmed help us to intuitively understand the concept "Technopolitical Resonance," intended to be an historically observable phenomenon, as the connection between historical actors based on their common technopolitical feeling-thoughts, when publicly performed through emotional practices. This concept aims to highlight the epistemic value of emotions, while investigating their performative effect. When a technopolitical feeling-thought is publicly performed, it becomes Resonant, in that it is a potential vehicle for establishing Technopolitical Resonance between actors. The public performance of this Resonant feeling-thought can elicit the same feeling-thought in the spectator: if the spectator also performs an emotional practice, Resonance is established between the actors (performer and spectator); thus, the Resonance of the technopolitical feeling-thought is amplified. Or, the performance can elicit different feeling-thoughts in the spectator: if the spectator performs an emotional practice showing disagreement, Resonance is not established between the actors; the Resonance of the technopolitical feeling-thought is consequently weakened, or even countered, if an opposite feeling-thought is performed.[49] If spectators do not react to the performance, then the technopolitical feeling-thought stops being Resonant once the performance is over. The same performance, however, can be re-enacted at some point (think about remaking a movie; or re-printing a book long out of circulation): the technopolitical feeling-thought becomes Resonant again, and Resonance can be established between the new pair actor/performer and actor/spectator.

The concept Technopolitical Resonance can be further clarified by looking at existing works on the significance of emotions in the history of technology. Zachary Loeb wrote about computer scientist Joseph Weizenbaum's concerns regarding technological development, analyzing his correspondence with Lewis Mumford and situating their common emotions within a wider "community of

48 Ahmed. 71.

49 For example, Alice has a technopolitical feeling-thought. She publicly performs it through an emotional practice. Bob witnesses the performance, and realizes he has the same feeling-thought. He then performs a similar emotional practice to demonstrate this. Technopolitical Resonance is established between Alice and Bob. But Alice's performance was also witnessed by Charlie, who doesn't share Alice's technopolitical feeling-thoughts. Charlie decides to perform an emotional practice based on opposing feeling-thought. In this way, Charlie opens a new channel for establishing Technopolitical Resonance, based on different feeling-thought. Now Eve arrives. She witnessed Alice and Bob's performance, and then Charlie's. She can perform an emotional practice, and establish Technopolitical Resonance with Alice and Bob, or with Charlie. If she does nothing, no Technopolitical Resonance is established.

criticism."[50] This connection between Weizenbaum and Mumford, I argue, is an example of Technopolitical Resonance. The technopolitical feeling-thought they shared were also visible in their books, and therefore publicly performed. When Mumford described his concerns about technology misuses (his technopolitical feeling-thought), he publicly performed a mobilizing emotional practice. When Weizenbaum read Mumford books, he became a spectator to this public performance. Weizenbaum went on to perform similar mobilizing emotional practices as Mumford. This shows there was Technopolitical Resonance between Mumford and Weizenbaum, as there was among the members of their wider "community of criticism." They could understand what the other meant, on both an emotional and intellectual level.

When the opposite occurs, the performance of an emotional practice elicits different feeling-thought in the spectator than intended. A good example are nuclear energy debates. Spencer Weart famously pointed out the existence of both "Nuclear fears" and "Nuclear hopes."[51] These often revealed two sides of the same coin. The promise that nuclear power plants would bring jobs can be seen as a mobilizing emotional practice performing Nuclear Hope.[52] However, as shown by Jaume Valentines-Álvarez and Ana Macaya-Andrés, Spanish anti-nuclear movements often addressed this same promise in their arguments opposing the construction of nuclear plants, by pointing out that these new jobs were worse than the old ones.[53] In other words, they performed a mobilizing emotional practice based on "Nuclear Fear." Here, the Spanish government and the activists were in explicit conflict: those who assisted both performances could either adopt a "pro-nuclear" position or an "anti-nuclear" position, but not both. The anti-nuclear emotional practices not only weakened, but countered the Technopolitical Resonance of the pro-nuclear feeling-thoughts (and vice versa).

Valentines-Álvarez and Macaya-Andrés highlight another aspect to keep in mind when examining Technopolitical Resonance. When a feeling-thought is performed through an emotional practice, the emotion(s) involved in the feeling-thought do not always match those involved in the emotional practice. Anti-nuclear activists often mobilized "amusement" in order to perform their feeling-thoughts on nuclear technologies' "fearful" consequences.[54] In this specific case, the activists' intent was clear. However, in other cases, the mismatch between the feeling-thought and the emotional

50 Zachary Loeb, "The Lamp and the Lighthouse: Joseph Weizenbaum, Contextualizing the Critic," *Interdisciplinary Science Reviews* 46, no. 1–2 (2021): 19–35.
51 Weart, "The Rise of Nuclear Fear."
52 Weart. 87.
53 Jaume Valentines-Álvarez and Ana Macaya-Andrés, "Making Fun of the Atom: Humor and Pleasant Forms of Anti-nuclear Resistance in the Iberian Peninsula, 1974–1984," *Centaurus* 61, no. 1–2 (2019): 70–90.
54 Valentines-Álvarez and Macaya-Andrés.

practice could be less explicit, which the researcher might overlook. As I discuss in chapter 1, behavioral scientists often (mis)categorized politically informed criticism of computers as a symptom of "fear" or "anxiety" induced by computers. When similar mis-categorizations happen, the historical actors' actual feeling-thoughts risk being lost in the story, along with the full significance of the emotional practices involved in performing the feeling-thoughts.

The concept of Technopolitical Resonance aims to tackle this issue by fostering an actor-centered understanding of emotions' role in the history of technology. Arguably, the works by Loeb, Valentines-Álvarez and Macaya-Andrés already go in this direction. However, their perspective is relatively new in historiography regarding emotions and technology. Spencer Weart and David Nye identified two crucial emotions in the history of technology: "Nuclear Fear"[55] and the "American Technological Sublime."[56] Both authors showed the multiple historical occurrences of these emotions, and their shifting meanings, by discussing several sources and historical actors. But, for different reasons, both authors leave many questions unanswered on the actual significance of these emotions for the historical actors.

Nye only addresses historical actors at the moment they experience a particular emotion, some manifestation of the "technological sublime."[57] For example, Nye defined the early 1900s electrified landscape emerging in large North American cities as an "unintended sublime," fostered by the rise of US consumer capitalism. Nye reported that a young Lewis Mumford was awestruck by New York City's electrified landscape.[58] Like Mumford, the poet Ezra Pound had the same experience of the unintended sublime, as did many people in Times Square.[59] This shows the overall historical relevance of the unintended sublime, but doesn't say how (and if) it was relevant for the technopolitical feeling-thought of such diverse historical actors as Mumford, Pound, and a passerby in Times Square. Mumford later became one of the earliest critics of the "dynamic sublime" symbolized by the atomic bomb.[60] But, beyond these specific occurrences, what did the "American technological sublime" mean for Mumford, and what did Mumford mean for the "American

55 Weart, *Nuclear Fear; The Rise of Nuclear Fear*.
56 David E. Nye, *American Technological Sublime* (MIT Press, 1996).
57 In *Bored, Lonely, Angry, Stupid: Changing Feelings about Technology, from the Telegraph to Twitter* (Harvard University Press, 2019), Luke Fernandez and Susan J. Matt analyzed the changing "American emotional style" in connection with technological development. The book features interviews with multiple actors, but we don't learn what they do before and after their "emotional style" changes.
58 Nye. 192.
59 Idem.
60 Nye. 231.

technological sublime"? Did Mumford's part in that "community of criticism" identified by Loeb affect his experience of the sublime, and vice-versa?

Whereas Nye leaves the reader wondering about Mumford's emotional life, Weart enforces a stringent generalization on his actors' emotions. This leaves little room for further questions or analysis (unless by undoing Weart's generalization, as Valentines-Álvarez and Macaya-Andrés did). Weart reproduced the rational/emotional dichotomy in his analysis, where "rational" has a positive meaning and "emotional" a negative one. Weart does not enforce this dichotomy in absolute terms, but for him, "emotions" should clearly not play a role in debates on nuclear energy. Weart recognized the internal coherence of the anti-nuclear movement's positions, but ultimately enforced a strict divide between those "on the side of both rationalized organization and the established pattern of economic growth" (nuclear energy supporters), and those "under the banners of victimization, feelings, and nature" (the anti-nuclear movement).[61] So what about the pro-nuclear side's emotions? And the anti-nuclear side's rationality? Can a person ever have "more emotions" or "less emotions" than another? What if the difference is rather in how emotions are publicly performed, and which emotions are considered desirable (by society, or the researcher), and which are not?

The concept "Technopolitical Resonance" can be further clarified by comparing it with the notion "Sociotechnical Imaginaries" developed by Sheila Jasanoff and Sang-Hyun Kim. They stress the combined shaping of political visions and technology imaginaries, showing how the two reinforce each other. Sociotechnical Imaginaries are defined as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology."[62] Emotions also help shape Sociotechnical Imaginaries, because these are correlated with the "shared fears of harms that might be incurred through invention and innovation, or of course the failure to innovate."[63] However, not every "publicly performed vision" on the societal significance of technological development fits the Sociotechnical Imaginary definition. As I have learned during my research, Italian socialists' historical debates on computers produced an ongoing and open conversation, rather than a specific imaginary "institutionalized" or "stabilized" over time. And whereas there were many ideological differences within Italian socialism, a shared "emotional

61 Weart, *The Rise of Nuclear Fear*. 219.
62 Sheila Jasanoff and Sang-Hyun Kim, Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power (University of Chicago Press, 2015). 4.
63 Idem.

style is visible,"[64] in other words a shared regulating emotional practice,[65] informing their technopolitical feeling-thought.

Investigating Technopolitical Resonance reveals historical paths and convergences that would not be visible, or deemed significant, if looking strictly for imaginaries. While the concept Sociotechnical Imaginary examines how political visions of technology are stabilized over time in a specific place, the concept Technopolitical Resonance aims to focus on how these visions are transmitted across different times and spaces. Whereas Sociotechnical Imaginaries help us understand how certain *feelings* were used to promote certain *thoughts,* Technopolitical Resonance stresses the convergence of *feelings* and *thoughts*.

To summarize, Technopolitical Resonance: 1) is a connection established between historical actors based on their common technopolitical feeling-thoughts; 2) can be observed by looking at publicly performed emotional practices; it therefore 3) fosters an actor-centered understanding of emotions' significance in the history of technology; and 4) stresses the non-linear and non-incremental convergence of feelings and thoughts across time and space.

Technopolitical Resonance answers my second research question, *how* emotional narratives on computers fostered a re/de-politicization of computer debates and design. My argument is that a technopolitical feeling-thought does not necessarily foster political debates on technology: its aims might be to discourage public scrutiny and analysis of technological development's societal and political implications. When a de-politicizing technopolitical feeling-thought is performed through emotional practices, there are two consequences: these practices might foster other similar practices, therefore amplifying the Technopolitical Resonance of the original feeling-thought, and a further de-politicization of computer debates; or, they can be countered by emotional practices amplifying a different source of Technopolitical Resonance, which might foster a re-politicization of the debate. The same process can work in the opposite direction: a technopolitical feeling-thought aimed at re-politicizing computer debates might either be amplified by the presence of further emotional practices, or stopped by the lack of them; and, therefore, be more or less successful in its re-politicizing aims. But before looking into whether a de- or a re-politicization happens, it is necessary to pinpoint which emotional practices, and therefore which emotions, are involved in technopolitical feeling-thought.

64 Benno Gammerl, "Emotional Styles – Concepts and Challenges," *Rethinking History* 16, no. 2 (June 2012): 161–75.

65 Scheer, "Are emotions a kind of practice?". 216-7.

3. The Black Box Entanglement: “tech-fear” and the Computer Age

My first research question thus asks which fears were involved in public debates on the societal significance and design of computers. Several scholars have mentioned how, since the end of WWII, “fear of falling behind” influenced technology adoption by companies and consumers.[66] The concept of “fear of falling behind,” however, is often loosely defined. The most extensive analysis of this fear is by Darryl Cressman, who recently evidenced the significance of Fear of Falling Behind for the notion of “disruptive innovation.”[67] Here, I investigate this fear in connection with Cold War technology discourses: Fear of Falling Behind presented computers as an urgent and unavoidable technology, whose speedy adoption was necessary to achieve and maintain political, economic, and social status.[68]

Fear of Falling Behind can be envisioned as a “tech-fear,” a concept proposed by Martina Heßler and Bettina Hitzer.[69] They discussed four methodological challenges and research opportunities related to the concept “tech-fear,” which are useful to further pinpoint the significance of Fear of Falling Behind in the history of computing. First, fear of technology is not only fear of an object, but often reflects deeper societal concerns. And the same applies to “technology by fear”: Fear of Falling Behind evokes a specific idea of how society should be run, and of what could harm it. Second, there is always a complex and multifaceted relationship between technology and fear. Some emotional practices aimed at countering Fear of Falling Behind were also based on fear, showing how the same emotion could foster opposing views on computers. Third, when analyzing fear, it is important to consider its interaction with other emotions. As further discussed in section 6, my analysis of Fear of Falling Behind inevitably intersects with a larger set of recurring emotions. Fourth, fear is also related to the materiality of the technology. Fear of Falling Behind promotes a technology which is designed in a specific way.

66 See A. T. Colwell, “Trends in the Automobile and Aircraft Industries,” *Financial Analysts Journal* 10, no. 3 (1954): 65–69; Susan Wright, “Molecular Biology or Molecular Politics? The Production of Scientific Consensus on the Hazards of Recombinant DNA Technology,” *Social Studies of Science* 16, no. 4 (1986): 593–620; Kazem Chaharbaghi and Robert Willis, “The Technology, Mythology and Economy of Technology,” *Management Decision* 45, no. 6 (2000): 394–402; Andrew McAfee, “Do You Have Too Much IT?” *MIT Sloan Management Review* 45, no. 3 (2004): 18–22.

67 Darryl Cressman, “Disruptive Innovation and the Idea of Technology,” *Novation: Critical Studies of Innovation*, no. I (2019): 23–23.

68 See Sanvitale, “Fear of Falling Behind.”

69 Martina Heßler and Bettina Hitzer, “Tech-Fear. Histories of a Multifaceted Relationship,” *TG Technikgeschichte* 86, no. 3 (2019): 185–200.

Drawing on academic literature and empirical observations of source materials (see chapter 1), I noted that in Cold War US the computers promoted through Fear of Falling Behind were more often than not also "black boxes." I thus developed the concept of "Black Box Entanglement" to highlight the fourth feature of Fear of Falling Behind as a "tech fear".

The Black Box Entanglement is a technopolitical feeling-thought which employs a tech-fear to promote the adoption of a black-boxed technology, functional to foster or maintain a political vision and its underlying political values. I use the word "entanglement" to stress that three components are interwoven in this concept: a political vision, and emotional discourse, and a technology design. My investigation started in Cold War US, where the Black Box Entanglement threatened that those who failed to adopt the black-boxed technology would "fall behind" the upcoming Computer Age, intended as a technologically advanced capitalist society. The Black Box Entanglement, I claim, had a powerful de-politicizing effect, because it normalized a deterministic perspective on technological development's societal and political significance, with no space for political questioning or alternatives. This dissertation focuses on how the Black Box Entanglement was reproduced or challenged in Italy, and on the consequences for the re/de-politicization of local computer debates and design.

The Black Box Entanglement is a fruitful concept to investigate computers de/re-politicization because it addresses at once the micro-politics and the macro-politics of computing. These two concepts (micro-politics and macro-politics) can be linked to specific formulations in academic literature.[70] Here I draw from existing definitions of "micro-politics" and "macro-politics," using them as intuitive formulations to illustrate the diverse political questions involved in technological development.

With "macro-politics," I refer to the values, visions, ambitions, and ideals accompanying the development of a technology, focusing on how it is presented, then discussed, and possibly re-articulated in the public arena. Multiple macro-politics might overlap in the history of the same technology. Computers are indeed prominent examples. Were computers seen as tools for command and control by the US military-industrial complex? Yes. Were computers seen as tools for individual freedom and empowerment by the first digital countercultures? Also, yes. These are both macro-political visions. Investigating the macro-politics of computing involves asking "why" computers were made, or "what else" they could be used for.

70 Fischer and Wenger, "Artificial Intelligence."

With “micro-politics,” I refer to the design process and actual functioning of the technology. The materiality of the technology is the core. Looking at computers from a micro-political perspective means asking “who” is making the technology, “how” it is made, and “who else” can intervene in its functioning (by altering, adapting, or stopping it) after it leaves the laboratory or production plant. Also in this case, multiple micro-political configurations can emerge around the same technology. The most well-known examples in the history of computing are debates on “free and open source software” vs. “proprietary software,” about whether computer software should be a “black box” or not for its users.

This dissertation analyzes a specific occurrence of the Black Box Entanglement, centered on Fear of Falling Behind, computers, and Cold War capitalism. However, the concept of Black Box Entanglement could also be applied to different tech-fears, technologies, and political projects. In general terms, the Black Box Entanglement can be observed when: 1) a “black boxed” technology (thus implying a specific micro-politics) is promoted, either as a personal commodity or in institutional settings; 2) the technology is functional to foster and/or maintain a distinct set of political values and plans (a macro-political vision); 3) the technology is promoted through one or more tech-fears on what will happen if the technology is not used.

4. A black box is a black box. On politics and black boxes in the History of Computing

Having defined the Black Box Entanglement, I now discuss my vision of the “black box” and how it relates to the de-politicization and re-politicization of computers’ macro and micro-politics. I thus turn my attention to why, and in what way the “black box” is a politically interesting construct in the history of computing.

The concept “black box” has a special relationship with the history of computing: it became popular in the late 1950s, in the emerging research field of cybernetics. Ross Ashby used the term “Black Box Theory” to describe “when the system is such that not all of it is accessible to direct observation.”[71] Norbert Wiener defined a “black box” as “a piece of apparatus, such as a four-terminal network with two input and two output terminals, which performs a definite operation on

71 Ross W. Ashby, *An Introduction to Cybernetics* (Chapman & Hall Ltd., 1956). vi.

the present and past of the input potential, but for which we do not necessarily have any information of the structure by which this operation is performed."[72]

In the following decades, the notion "black box" was applied in various research fields, sometimes critically and sometimes favorably, for example in the philosophy of science,[73] economics,[74] and psychology.[75] Over time, the notion "black box" became synonymous with anything whose functioning was obscure to an external observer, and a popular buzzword for technology critique.

Here, however, I am not interested in these fields or the history of cybernetics. Nor do I intend to create a fictional "black box" in order to claim I have opened it. My interest in the "black box" is as a deliberate material construct. A box that could be open, but is not, for reasons that can be found in both the micro-politics and macro-politics of computers.

A politically more interesting "black box" emerged from Actor Network Theory (ANT) and the Social Construction of Technology (SCOT). Since the late 1980s, History of Technology and Science and Technology Studies scholars began critically addressing the "black box" as a sociotechnical artifact, arguing it was time to "open" it. This research interest was prompted by classical essays like Bruno Latour's "Opening Pandora's Black Box"[76] and Trevor Pinch's "Opening Black Boxes: Science, Technology, and Society."[77] Their efforts to "open the black box" centered on the analysis of the socio-cultural values and beliefs influencing research practices in laboratories and expert communities. In this way, ANT and SCOT focused on the micro-politics influencing computer design: the choices, debates, and conflicts emerging in technology design and production.

But this micro-politics is always embedded in a macro-politics, which shapes the wider political processes for producing technology. The social constructivist methodology to investigate black boxes (including both ANT and SCOT) was criticized by Langdon Winner, who provocatively asked what happens if once opened, the black box turns out to be empty.[78] With this rhetorical

72 *Norbert Wiener, Cybernetics. Or: Control and Communication in the Animal and the Machine*, 2nd ed, (MIT Press, 1961). *xi.*
73 Mario Bunge, "A General Black Box Theory," *Philosophy of Science* 30, no. 4 (1963): 346–58.
74 Nathan Rosenberg, *Inside the Black Box* (Cambridge University Press, 1982).
75 Burrhus Frederic Skinner, "Cognitive Science and Behaviourism," *British Journal of Psychology* 76, no. 3 (1985): 291–301.
76 Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Harvard University Press, 1987).
77 Trevor J. Pinch, "Opening Black Boxes: Science, Technology and Society," *Social Studies of Science* 22, no. 3 (1992): 487–510.
78 Winner, "Upon Opening the Black Box and Finding It Empty."

question, Winner was pointing out that the social constructivist approach risked missing out on fundamental large scale social and political processes underlying technological development, as well as the significance of historical actors not actively involved in technology development. Ultimately, Winner observed, the social constructivist methodology "does not explore or in any way call into question the basic commitments and projects of modern technological society."[79] Which is to say, it does not address the macro-politics of technology. Therefore, the "black box" discussed by ANT and SCOT is not entirely suitable for my purposes, as I am also interested in macro-political aspects informing computers' micro-politics.

Winner's criticism of social constructivism suggests considering two further aspects of the political significance of "black boxes" in the history of technology. These allow us to pinpoint what kind of black boxes we are "opening," or perhaps closing, when investigating the historical relationship between computers and politics.

Winner's first observation is that for historical actors, the macro-politics of technology was usually not "black boxed." He noted that authors like Karl Marx, Lewis Mumford, Jacques Ellul or Martin Heidegger produced much more articulated criticism than his contemporaries on the macro-level intersections of technology and politics. I point out that these authors were very popular for most of the 20th century, not just in their life-time: Winner's observation is still valid in 2022.

Works discussing the relationship between macro and micro-political elements in the history of computing include *The Closed World* by Paul Edwards, who showed that cybernetics was a fundamental component of the Cold War military metaphors used by the US military-industrial complex.[80] On the other side of the iron curtain, Slava Gerovitch analyzed the various ideological influences informing Soviet cybernetics.[81] Outside the US/USSR Cold War dichotomy, Eden Medina's work on Project Cybsersyn discussed the (envisioned) role of computers and cybernetics in Salvador Allende's "Third way socialism" in Chile.[82] All these works provide fascinating and careful reconstructions of the multiple ways macro-political visions historically informed real or envisioned micro-politics of computing. But, I argue, they did not necessarily open a "black box" on the macro-political level. Historical actors were likely not aware of the specific ways politics

79 Winner, 375.
80 Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (MIT Press, 1997).
81 Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics* (MIT Press, 2002).
82 Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (MIT Press, 2011).

influenced computer design, but did realize that Salvador Allende wanted to advance socialism.[83] Politically informed counter-narratives are also documented, showing that computers' macro-politics was not just known, but also contested. The same "Cyborg discourse" presented by Edwards is an example of a counter-narrative, evidencing the shortcomings of the military-industrial complex computer discourse. And, as Andrew Russell showed, with the emergence of the "closed world" discourse in the United States, came the vision of an "open world."[84] Another example is Fred Turner's *From Counterculture to Cyberculture*, focusing on US computer countercultures and their connection with 1960s youth criticism of the military-industrial complex.[85]

A second and consequent insight on how to look at the "black box" from a political perspective, entails reflecting on academic researchers' role in closing boxes. Winner identified another shortcoming of social constructivism in the distinction between "relevant" and "irrelevant" social groups. The "relevant" groups tend to directly influence the making of technology, from engineers to policymakers, whereas people who do not have access to these institutionalized decision-making circles, or whose ideas and perspectives have been excluded or marginalized, are considered "irrelevant." The disinterest in such "irrelevant" perspectives is not only a literature gap, but can result in closing computers' macro-political box. Making and publishing historiography also mean becoming part of this macro-politics, therefore influencing its present and future direction.[86]

The bias against "irrelevant" social actors is an old one in the history of computing. In the past decade, many scholars have addressed this, producing innovative and compelling works opening up the field to previously marginalized historical actors and experiences.[87] However, something odd is happening. On the one hand, an ever-expanding group of women, non-US actors, LGBTQ+ communities, and other overlooked social groups are finally being recognized in the historical records. On the other hand, the field still has a blind spot for the macro-politics which has fostered,

83 This argument applies to other works analyzing the historical intersections between technology and politics, see: David F. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (Oxford University Press, 1979). See a recent series "Computing Capitalisms: Business, History, and Information Technology," Devin Kennedy and Gerardo Con Diaz, "Introduction to Computing Capitalisms," *IEEE Annals of the History of Computing* 42, no. 3 (2020): 5–10, and "Computing Capitalisms—Part 2," *IEEE Annals of the History of Computing* 43, no. 02 (2021): 5–5.

84 Andrew Russell, *Open Standards and the Digital Age* (Cambridge University Press, 2014).

85 Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (University of Chicago Press, 2010).

86 Hayden White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Johns Hopkins University Press, 1973); Marshall Sahlins, *Islands of History* (University of Chicago press, 1985); John Comaroff and Jean Comaroff, *Ethnography and the Historical Imagination* (Routledge, 1992).

87 All the works I have mentioned before go in this direction. A more recent work: Thomas S. Mullaney et al., *Your Computer is on Fire* (MIT Press, 2021).

or countered, the black-boxing of computer design (a specific micro-political configuration). I refer to the history of the Free and Open Source Software movement and hacking.

The relevance of these movements in the history of computing is undeniable. Yet, the first scholars in the humanities to investigate them were not historians, but anthropologists. The history of Free and Open Source Software (FOSS) is discussed by Christopher Kelty in his *Two bits*, a cultural history of the free software movement.[88] Works by Gabriella Coleman provide a more strictly "anthropological" perspective, yet are fundamental references for anyone wanting to know more about North American hacking communities.[89] Both Kelty and Coleman address the contested macro-politics of technology which informed hackers and FOSS activist practices, stressing how these movements exemplified a rearticulation of capitalism in the United States by practicing a different micro-politics of computing. On the other hand, Maxigas and Johan Soderbergh show that in the European context, hacker and FOSS practices are also prominently rooted in anti-capitalist, socialist political traditions.[90]

The collection of essays *Hacking Europe*, edited by Gerard Alberts and Ruth Oldenziel,[91] was one of the first works to address hacking from a historiography perspective. A remarkable aspect of this edited volume is that it combines two different framings of hacking: on the one hand, an explicitly political version, where the quest for different micro-politics in computer design (free and open source instead of proprietary software) was also tied to a macro-political discourse challenging the dominant neoliberal political values and promoting instead a left-libertarian vision;[92] on the other hand, a more de-politicized version of hacking focused on micro-political aspects (being able to freely tinker with computers and pursue a personal hobby), with no explicit macro-political intent.[93] Both framings are historically meaningful, and the point here is not to assess who the "real" hackers are. However, historiography evidencing the connections between hacking and radical politics is still minimal.

88 Christopher M. Kelty, *Two Bits: The Cultural Significance of Free Software* (Duke University Press, 2008).
89 Gabriella E. Coleman, *Coding Freedom: The Ethics and Aesthetics of Hacking* (Princeton University Press, 2013); Gabriella E. Coleman and Alex Golub, "Hacker Practice: Moral Genres and the Cultural Articulation of Liberalism," *Anthropological Theory* 8, no. 3 (2008): 255–77.
90 Maxigas, "Hacklabs and Hackerspaces"; Johan Söderberg, *Hacking Capitalism: The Free and Open Source Software Movement* (Routledge, 2015).
91 Alberts and Oldenziel, *Hacking Europe*.
92 See chapters by Bruno Jakic (107-128), Kai Denker (167-188), and Nevejan and Badenoch (189-218) in Alberts and Oldenziel.
93 See chapters by Frank Veraart (25-48), and Thomas Lean (49-72) in Alberts and Oldenziel.

Most works on hacking and FOSS in the history of computing, center on the second interpretation, focusing on how hackers promoted alternative micro-politics. In these accounts, conflicting and critical macro-political issues are often diluted. For example, Christopher Tozzi presented the history of FOSS in his *For fun and profit.*[94] He convincingly described "fun" and "profit" as two key motivations for the origin and diffusion of FOSS, and discussed conflicts between "free software" and "open source" hackers. However, Tozzi ultimately produced a teleological narrative on FOSS where political conflicts within the movement or with external actors, are only small bumps in a new computer revolution. In another example, Thomas Haigh published a thorough analysis of the relevance of Steven Levy's *Hackers: Heroes of the computer revolution* in the history of computing.[95] He concluded his article with concerns about "the blending of hacker culture with big tech dominance."[96] Yet, he only briefly mentioned the existence of a long-lasting, transnational, left-wing, anti-corporate hacker culture, and did not discuss whether this culture could play a role in countering "the blending of hacker culture with big tech dominance."

Furthermore, the historiography of computing providing macro-political perspectives on hacking and FOSS is still centered on US capitalism. In describing the Counterculture, Turner makes an early differentiation between the more politicized "New Left" and the less politicized "New Communalists" from which the cyberculture I analyzed emerged. He traces a path from the political criticism of left-libertarian countercultures to the re-affirmation of traditional capitalist values such as individualism and consumerism through the right-libertarian "Californian Ideology."[97] Similarly Russell describes the ideological conflicts around the notion of "open" as still prominently centered on capitalism's ideological pillars.[98] If we include Coleman and Kelty's works, it is now well established that in North America, hacking and FOSS were informed by capitalist values and principles. But, 15 years after Turner's work, the history of computing has still not discovered what happened to the other part of the Counterculture, the explicitly politicized, and anti-capitalist "New Left."

Although some activists are no longer considered "irrelevant" social actors, the current historiography of hacking and FOSS shows that new hierarchies of relevance/irrelevance have been indirectly established. In this sense, hackers and FOSS activists only become relevant if they

94 Christopher Tozzi, *For Fun and Profit: A History of the Free and Open Source Software Revolution* (MIT Press, 2017).
95 Thomas Haigh, "When Hackers Were Heroes," *Communications of the ACM* 64, no. 4 (2021): 28–34.
96 Haigh, 34.
97 Richard Barbrook and Andy Cameron, "The Californian Ideology," *Science as Culture* 6, no. 1 (1996): 44–72.
98 Russell, *Open Standards and the Digital Age*.

conform to capitalist macro-politics. But in this way, I argue, the "black-box" of computer macro-politics is only partially opened. Demonstrating this is the fact that these stories' protagonists tend to be always the same white, male, middle-class, North American "computer boys"[99] who already populate much of the history of computing: the code might be open, but the glass-ceiling is still there, and the existing micro and macro-politics of computing have only been superficially challenged.

I therefore look at black-boxes through the stories of the social actors still considered "irrelevant" in the history of computing. To these actors, the relationship between the macro and the micro-politics of computing was a contested and open theme of debate, often opposed to US capitalism. Their technopolitical feeling-thoughts were also embedded in a larger debate on the changing strategies and aims of 20th century socialism. Therefore, to understand how they made sense of computers' micro and macro-politics, we need to understand how they made sense of socialism. My aim is not to create yet another Cold War style dichotomy (capitalism versus socialism), but enrich the historical understanding of the multiple ways the "black boxed" computer has been an object of political scrutiny and debate.

Some very relevant "irrelevant" actors include the most famous Italian computer company, Olivetti, ultimately more effective in fostering the discourses about computers than actually making them; the small but committed group of IBM Italia labor unionists, who sometimes attached posters upside down in a creative attempt to attract attention, since they were often ignored by both their company's management and by their colleagues; the Italian Communist Party (PCI), which was a fundamental modernizing force and the party that took the most interest in computers, but was constantly excluded from National governments; the social anarchists and libertarian communists in Italy, who either completely ignored computers or produced very poignant and challenging perspectives on them. All these "irrelevant" social actors engaged with "relevant" political issues related to computers. The fact that computers were offered to them as "black-boxes" was questioned: by the IBM unionists, who pointed out that the company shared very little technical know-how; by the PCI, which criticized the suitability of ready-made computer systems for addressing local needs; by the inquisitive anarcho-punks, who did not wait for permission to look inside the computer black-box and created "art and beauty"[100] from it.

99 Nathan L. Ensmenger, *The Computer Boys Take over: Computers, Programmers, and the Politics of Technical Expertise* (MIT Press, 2012).

100 From "hacker ethic" in: Steven Levy, *Hackers: Heroes of the Computer Revolution* (Anchor Press/Doubleday, 1984).

In presenting these unfolding histories, I have no interest in becoming an "STS hero" who opens the black box of computers in order to make science and technology policy "fun."[101] If I could choose what epic creature to be, I'd go for an interdisciplinary mermaid, half historian and half anthropologist: with my tail I swim in the sea of the history of technology, and with my eyes I observe the human cultures inhabiting the land. My ambition is to make science and technology policy political. This means making space for a wide array of political actors in public debates about computers. I don't want to "open the black box," but "break the black box" in such a way that it is impossible to close it again as it was before. But I am a benevolent mermaid: I do not want to break the black box by causing a shipwreck with my chant, losing its content to the abyss. Instead, I will sing the stories of those who tried, sometimes failed and sometimes succeeded, to break the computer's black box by engaging with it politically. Readers who find these stories and perspectives "relevant" can sing about them as well. If there is more singing, and it reaches the right frequency, the black box can be broken. Not by applying direct, brute force, but thanks to "resonance": like a glass shattered through a high-pitched note,[102] or a bridge that crumbles from high wind.[103]

The kind of resonance which could break a black box does not require heroes, but empathy. It is again Wikan's Resonance, in its third meaning: Resonance-empathy, a connection which can be established between the reader and the historical actors presented here. This does not mean I want readers to start collecting Italian Communist Party memorabilia, or become hackers. What this type of Resonance requires is "a willingness to *engage* with another world, life, or idea."[104] I return to this type of Resonance in the epilogue. For now, all I ask is that readers (if they haven't already done so) leave the "rational vs. emotional" and enter the feeling-thinking world.

5. Looking for Technopolitical Resonance. Research methodology

To operationalize my investigation of Technopolitical Resonance (the historical phenomenon) through research methodology, I divide my earlier definition into parts. "Technopolitical Resonance," as discussed in section 2, is the connection established between historical actors based on a common technopolitical feeling-thought, when this feeling-thought is publicly performed

101 Pinch, "Opening Black Boxes." 508.
102 https://www.youtube.com/watch?v=17tqXgvCN0E Accessed September 20, 2022.
103 https://www.youtube.com/watch?v=kZNjbWy6c7c Accessed September 20, 2022.
104 Wikan, "Beyond the Words." 463.

through emotional practices. It is therefore necessary to find interlinked elements: a connection; publicly performed emotional practices; feeling-thought on technology's societal and political implications. Looking for a "connection" requires choosing more than one site of inquiry. The notion "site" is not only in a strictly geographical sense, but also as a "site of cultural production" in the anthropological sense. A museum, a political party, a company, are all "sites of cultural production." Observing "publicly performed" emotional practices implies that these sites of cultural production must be publicly accessible at the time the emotional practices were performed. Furthermore, these practices should point out technopolitical feeling-thought, meaning it must be possible to find both politics and technology discussed at these sites. To stress this perspective, I call these "sites of technopolitical cultural production."

The methodology to investigate "Technopolitical Resonance" involves four steps. The first step is to select one or more geographical sites and establish "Resonance" with the historical actors. Here I use "Resonance" in its second meaning, a research methodology as discussed by Unni Wikan. Resonance-methodology entails establishing a connection between the researcher and the historical actors, based on feeling-thinking. Wikan used Resonance-methodology as the basis for an "experience near anthropology," which could resolve interpretative anthropology's inaccuracies in the study of emotions.[105] The central idea is that, when examining feeling-thoughts, the researcher's own emotions have an important epistemic function. This prevents (or should help to prevent) interpretative layers imposing on an actor's emotional life, layers which at times add complexity without improving understanding. How the researcher uses their own emotions to establish resonance with the actors inevitably depends on multiple factors and needs to be reviewed case by case. For my own case, see section 8.

Resonance-methodology also has a more pragmatic side. An "experience near anthropology" requires putting actors' "existential concerns" center stage.[106] Establishing Resonance with the historical actors means trying to understand what was important to them, what they thought about the world. Anthropologists describe this process in various ways.[107] The term I prefer is the neologism coined by Italian anthropologist Leonardo Piasere, "imbombegamento."[108] It comes from the Veneto regional dialect "imbombegá" meaning "to absorb something like a sponge." Practicing

105 Wikan, "Towards an Experience Near Anthropology."
106 Wikan. 299.
107 In English "internalization" and in French "imprégnation." Olivier de Sardan, Jean-Pierre. "La politique du terrain. Sur la production des données en anthropologie." Enquête. Archives de la revue Enquête 1 (1995): 71-109. Kirsten Hastrup and Peter Hervik, "Introduction," in *Social Experience and Anthropological Knowledge* (Routledge, 2003).
108 Leonardo Piasere, *L'etnografo Imperfetto: Esperienza e Cognizione in Antropologia* (Laterza, 2002).

imbombegamento requires gaining a variegated understanding of local history and culture. When applied to Technopolitical Resonance, it is important to examine three aspects: local political history, including institutional political actors like parties and governments, and also grassroots social movements and non-institutional political actors; the local history of technology, either by focusing on diverse technological artifacts or only one technology; finally, historical events which had a particular emotional significance for the actors, for example a war, an economic crisis, a natural catastrophe, a period of political violence. My imbombegamento is described in section 7.

The second step to investigate Technopolitical Resonance, is to identify sites of technopolitical cultural production, and the resulting technopolitical discourses within the wider geographical sites. This can be done by looking for any mention of politics in technology discourses, and any mention of technology in political discourses. These discourses must be public, which excludes private diaries or closed meetings. Examples of suitable sources to identify technopolitical cultural production are conference or public assembly proceedings, newspapers, magazines, and books. It should be noted whether there are recurring sources, events or people bringing actors together (or driving them apart). And silence is also important data: if technology is never mentioned in political debates, or vice versa if politics is never addressed in technology debates, then it is important to ask why.

The third step is to identify which emotional practices mediated these technopolitical discourses. Combining "emotional practices" with Wikan's "Resonance" implies that the actors are always feeling-thinking, therefore emotions always play a role in what they say and do. These emotions may be more or less visible, but they are there. Different methodological decisions are possible, depending on which emotional practices the researcher is interested in and which sources are available.[109] In this work, I focus on regulating and mobilizing emotional practices emerging from textual sources, and only occasionally discuss naming and communicating practices.

How do we find these emotional practices? Having identified my actors' technopolitical discourses, I examined whether these discourses were also embedded in specific practices, and if these practices were informed by historically significant processes and events. Sometimes emotional practices emerged directly from textual sources, when actors explicitly spoke about emotions (e.g., IBM labor unionists often claimed that IBM management used fear to make workers feel vulnerable: here labor unionists were pointing at a mobilizing emotional practice performed by

109 Scheer, "Are Emotions a Kind of Practice?"

management). Some emotional practices were implied in the text (e.g., when Italian Communist Party members joked about IBM vendors during conferences, they were clearly mobilizing amusement, though they did not explicitly say "now we will poke fun at IBM!"). Sometimes they emerged from "thinking harder about what people are doing, and to work out the specific situatedness of these doings"[110] (e.g. when claiming that IBM management mobilized fear in the workforce, IBM unionists were also performing their own mobilizing emotional practice: they mobilized "working class pride" against "the IBM masters," because these discourses implied that managers' fearful emotional practices could be countered by workforce unity and solidarity).

The fourth and final step is looking more closely at the technopolitical feeling-thoughts implied by these emotional practices, to check if there was Technopolitical Resonance between the actors. An emotional practice can counter or amplify the technopolitical feeling-thoughts performed by another emotional practice. The countering happens when the first emotional practice is followed by a second one with different technopolitical feeling-thoughts. In this case, there is no Technopolitical Resonance between the actors performing the two emotional practices. This is what happened between IBM management and IBM labor unions in the example above: the management mobilizes fear, the union responds by mobilizing pride. Amplification happens when the first emotional practice is followed by a second emotional practice performing the same technopolitical feeling-thoughts. In this case, Technopolitical Resonance is established. For example, if the joke about IBM vendors is followed by a similar joke told by another conference attendee, there is Technopolitical Resonance between the two actors joking about IBM.

The context where the emotional practice is performed is crucial in order to identify the technopolitical feeling-thought informing it: I am not implying there is Technopolitical Resonance among all the people who ever made jokes about IBM vendors. But when Italian communists joke among themselves about IBM, yes: they are establishing Technopolitical Resonance by mobilizing amusement, because there is a shared technopolitical feeling-thought behind the joke. In fact, we should not mistake the emotion which is visible in the emotional practice with the technopolitical feeling-thought informing it. The communists were very critical of US multinational computer companies: When they mobilize the emotion "amusement" against IBM, the implication is that their technopolitical feeling-thoughts are better than IBM's. But if it was another US multinational computer company to mobilize amusement against IBM, this would imply they are better than IBM in delivering the promises of the same technopolitical feeling-thought.

110 Scheer, 217.

I therefore continuously carried out a process of "imbombegamento" in order to familiarize myself with my research area and historical period, and understand my historical actors' feeling-thoughts. Having identified my sites and actors, I did extensive archival research to find any mention of computers and technology, mostly in textual sources. I only used published or public materials, focusing on four main sources: books, in particular by Italian authors, but also internationally influential publications on computers; magazine and newspaper articles my actors produced; conference proceedings; publicly available gray literature, for example fanzines, conference booklets, leaflets, posters. Detailed descriptions of these sources are in section 7.

Having identified sites of technopolitical cultural production, and the relevant actors' discourses on computers, I analyzed these discourses to find emotional practices. By situating these emotional practices, I traced them back to technopolitical feeling-thoughts, and examined whether they established Technopolitical Resonance among the historical actors, thereby fostering a de/re-politicization of computer debates. My primary interest was in emotional practices pointing at the Black Box Entanglement, but ultimately a larger set of emotions and technopolitical feeling-thoughts emerged when historical actors challenged the Black Box Entanglement. In this sense, a preliminary finding is that the de-politicization and re-politicization of computer debates is always an emotionally multifaceted process, never informed by a single emotion.

6. From the Black Box Entanglement to the Principle of Hopeful Curiosity: emotions and technopolitical feeling-thoughts in Cold War Italy

Before moving to the dissertation outline, I summarize the other politically significant emotions intersecting with the Black Box Entanglement's history. These emotions emerged from my "imbombegamento" and my analysis of actors' discourses and practices. Not all of them were specifically related to technology. Historical actors often performed them in their wider political scripts, and these emotions eventually became relevant in the actors' technology discourses and practices.

Here, most "Fear of Falling Behind" occurrences are related to the Black Box Entanglement, meaning "fear of falling behind the technologically advanced capitalist society brought about by black boxed computers." But I also found occurrences of what I call "Socialist fear of falling behind," that is, "fear of falling behind the technologically advanced *socialist* society brought about

by computers." This emotion stemmed from deterministic interpretations of Marxism, arguing that techno-scientific developments in the proletariat's hands would naturally favor socialism. Another fear, often mobilized to counter Fear of Falling Behind, was the "Fear of Falling Inside." This stresses the risk of being assimilated into an undesired political vision, for example Counterculture's concerns of "falling inside" the "IBM society," symbolizing a social order incompatible with their left-libertarian values.

Other emotions emerged as pairs, for example "Revolutionary Fear" and "Revolutionary Trust." These emotions are always performed simultaneously, and stem from the political use of violence. For example, burning a computer because it symbolizes the "proletariat's class enemies," aims to make the "class enemies" afraid of the proletariat's power, and the proletariat trust its ability to cause a revolution against the class enemies. The conflicted relationship between the "proletariat" and the "bourgeoisie," or the "workers" and "masters," is connected to two other emotions: "Working Class Pride" and "Class Hatred." The first stresses the societal and political achievements obtainable through workers' solidarity and union. The second highlights the workers/masters conflict, by stressing the masters' role as "class enemies."

Four more emotions were important in Italian socialists' computer debates. One is based on, and named after, Ernst Bloch's "Principle of Hope."[111] It is hope in the possibility of achieving a socialist society, intended as a "concrete utopia" still in the making. The Principle of Hope rejects scientific socialism and other deterministic perspectives, stressing instead human agency's centrality in the making of socialism.[112] The second is "Scientific Curiosity": it combines trust in science's emancipatory potential, and eagerness to improve one's scientific knowledge. I use the word "science" in its broadest sense of codified knowledge about the natural (and human) world, obtained through empirical observation and reproducible methods, and including its applications (technology). This emotion encourages questioning and learning how technology is made. Other key emotions are "Creative Anger," fostering new ideas, practices, and artifacts that can address the source of anger, and "Electric Wit": using amusement for both critical and pedagogical reasons. The pedagogical aspect is fundamental here, and the word "Electric" is a reference to Socratic Irony.[113]

111 Ernst Bloch, *The Principle of Hope*. (MIT Press, 1986).

112 On Bloch's themes, see: Michael Löwy, "Romanticism, Marxism and Religion in the 'Principle of Hope' of Ernst Bloch," *Crisis & Critique* 2, no. 1 (2015): 350–55.

113 As explained by Bell and Naas: "In the Meno, Socrates is portrayed as a stingray or, more accurately, a torpedo ray who shocks or benumbs his interlocutors and causes them to question all their previously held beliefs." Jeremy Bell and Michael Naas, "Introduction: Plato's Menagerie," in Plato's Animals: Gadflies, Horses, Swans, and Other Philosophical Beasts (Indiana University Press, 2015), 1–10. 1.

In most cases, I analyzed these emotions in opposition to the Black Box Entanglement, and not as pointers to alternative technopolitical feeling-thoughts. Given the variety of actors I discuss in this dissertation, it was not possible to thoroughly identify all the different technopolitical feeling-thoughts informing their emotional practices. For example, although both IBM unionists and socialist women ultimately countered the Black Box Entanglement, the respective emotional practices might have been informed by different technopolitical feeling-thoughts on the societal significance of computers.

There is, however, one technopolitical feeling-thought which emerged from my research on Italian socialists' computer debates, that I decided to further investigate and eventually put center stage. I call this technopolitical feeling-thought "the Principle of Hopeful Curiosity," a combination of the Principle of Hope and Scientific Curiosity -the two main emotions on which is based. The Principle of Hopeful Curiosity stresses the centrality of human agency in making both socialism and technology, fostering hope for a human-centered, socialist use of technoscientific knowledge. My interest in this technopolitical feeling-thought stems from the connection between Bloch's *Principle of Hope* and Italian socialism's founding fathers Antonio Gramsci and Errico Malatesta.
One aspect of Bloch's work is particularly relevant here: the distinction between a "cold current" and a "warm current" in Marxist thought. The "cold current" is associated with the deterministic trends in scientific socialism and dialectic materialism, while the "warm current" stresses the "non-guaranteed character" of utopia, and the centrality of human agency in achieving it. According to Bloch, the two currents must go together, however the cold should always be functional to the warm.

Gramsci and Malatesta shared a similar understanding of socialism. Skeptical of the deterministic narratives within Marxism and anarchism popular at the time, they stressed instead the significance of human will in the making of socialism. Gramsci's connection with the Principle of Hope has been explicitly underlined by Jan Rhemann, who argued that Bloch's combination of "thinking *ad pessimum*" and "militant optimism" went hand in hand with Gramsci's "pessimism of the reason, optimism of the will."[114] The link between Malatesta and Bloch is less straightforward, as Bloch addresses socialism from a Marxist perspective. But, as Michael Löwy discusses, Bloch's early work on utopia was also informed by libertarian perspectives, notably by anarchist intellectual

114 Jan Rehmann, "Ernst Bloch as a Philosopher of Praxis," *Praktyka Teoretyczna* 35, no. 1 (2020): 85.

Gustav Landauer.[115] Löwy even described Bloch's early writings as being based on a "Marxist/libertarian, anarcho-Bolshevik utopia."[116] Löwy did not extend his analysis to *The Principle of Hope*, whereas Bloch explicitly criticized anarchism. Yet, I argue that his emphasis on "militant optimism," which is "the optimism of the will," also maintains a connection with the anarchist emphasis on "will" and "voluntarism." As Carl Levy has shown, Gramsci's voluntarism was informed by his exchanges with early 20th century Italian libertarian culture.[117] In this way, Bloch's Principle of Hope opened up a terrain of mutual understanding and dialogue (that is, resonance) between anarchism and Marxism, in which, as I will show in chapter 2, both Malatesta and Gramsci took part. But whereas Bloch's thoughts on socialism and utopia were intertwined with religious and mystical themes, scientific and technological development remained crucial aspects for Gramsci and Malatesta.[118] In other words, they replaced Bloch's mystical fascination with a "scientific curiosity." Many socialist actors over time established Technopolitical Resonance based on the Principle of Hopeful Curiosity. This technopolitical feeling-thought powerfully challenged the Black Box Entanglement, because it provided a counter macro-politics (not a capitalist, but a socialist society was the goal, and to be achieved through political agency, not technological development) and encouraged opening computers' black-boxes in order to practice Scientific Curiosity.

7. Emotions, computers and socialism in Cold War Italy: dissertation outline

To improve the readability of the text, I will often discuss Technopolitical Resonance in terms of the technopolitical feeling-thought on which it is based, and not the actors among which it is established. In these cases, I will say that the feeling-thought's Technopolitical Resonance is either "amplified" or "weakened/countered," instead of saying that it is "established" or "not established" among actors. For example, when I write formulations like "the actor performed an emotional practice which amplified the Black Box Entanglement's Technopolitical Resonance" I mean to say "the actor performed an emotional practice informed by the Black Box Entanglement, which established Technopolitical Resonance with other actors who performed practices informed by the Black Box Entanglement before."

115 Michael Löwy, *Redemption and Utopia: Jewish Libertarian Thought in Central Europe* (Verso Books, 2017). See also: Ruth Kinna, "Anarchism and the Politics of Utopia," in *Anarchism and Utopianism*, ed. Ruth Kinna and Laurence Davis (Manchester University Press, 2009).

116 *Löwy, Redemption and Utopia*, 140.

117 Carl Levy, "Antonio Gramsci, Anarchism, Syndicalism and Sovversivismo," in *Libertarian Socialism* (Springer, 2012), 96–115.

118 This is not to say that Ernst Bloch rejected the science: only that "scientific curiosity" did not play a central role for him as it did for Gramsci, Olivetti, and Malatesta.

Chapter 1, the Black Box Entanglement and its Discontents, defines the Black Box Entanglement and shows how it fostered a de-politicization of computer debates in the United States. My analysis starts with the military-industrial complex's technopolitical feeling-thoughts. They were the first actors in my time frame to perform emotional practices based on Fear of Falling Behind. The chapter centers on an emerging research practice investigating people's attitudes towards computers ("computer attitudes"), which developed within the Behavioral Sciences from the 1960s. Scholarship has criticized this research practice as a "medicalizing"[119] and "normalizing"[120] endeavor. I focus on its political significance, showing how researchers established Technopolitical Resonance with the US Cold War military-industrial complex.

This chapter illustrates how the emotional practices performed by "computer attitudes" researchers strengthened the Black Box Entanglement, by establishing Technopolitical Resonance with the US military-industrial complex technopolitical feeling-thoughts. Counterculture's "Fear of falling inside US capitalism" became, from the researchers' perspective, "Fear of computers." They thus fostered a de-politicization of computer debates and design, because critical subjects were categorized as pathological. By mobilizing, naming, and regulating emotional "attitudes" towards computers, this research practice supported the idea that a "positive" computer attitude was needed in order to not fall behind the technologically advanced capitalist society brought about the Computer Age. "Negative" computer attitudes, such as "computerphobia" and "computer addiction" had to be fixed. At first, the de-politicization involved computing's macro-politics: the "computerphobia" definition was informed by the Counterculture's criticism of computer misuse. In the late 1970s, the micro-politics of computing entered "computer attitudes" research, with hackers' categorization as "computer addicted."

Chapter 2, Before the Black Box Entanglement, introduces the Italian context and the technopolitical feeling-thought performed. The Black Box Entanglement has a marginal presence in this chapter. The focus is the technopolitical feeling-thoughts which would later play a role in its local reception. The chapter centers on three key figures in Italy's 20th century political history and history of technology: liberal-socialist computer entrepreneur Adriano Olivetti (1901-1960),

119 Martin Bauer, *Resistance to New Technology* (Cambridge University Press, 1995).

120 Lori Reed, "Domesticating the Personal Computer: The Mainstreaming of a New Technology and the Cultural Management of a Widespread Technophobia, 1964–," *Critical Studies in Media Communication* 17, no. 2 (June 2000): 159–85; "Governing (through) the Internet: The Discourse on Pathological Computer Use as Mobilized Knowledge," *European Journal of Cultural Studies* 5, no. 2 (May 1, 2002): 131–53.

communist intellectual Antonio Gramsci (1891-1937), and anarchist organizer Errico Malatesta (1853-1932).

I claim there was Technopolitical Resonance between them, based on the Principle of Hopeful Curiosity. Their writings and work had a key role in countering the Black Box Entanglement. On the one hand, Gramsci's and Malatesta's legacy fostered debates on different macro-politics of computing, which avoided Fear of Falling Behind's threatening promises while envisioning a "socialist use" for computers. On the other hand, Adriano Olivetti showed it was possible to practice alternative micro-politics of computing, outside the US military-industrial complex's plans. However, the Principle of Hopeful Curiosity's Technopolitical Resonance was not amplified in a linear way. In the late 1960s, two crucial events had a negative impact. First, Olivetti's electronic division was sold to General Electric. This was after Adriano Olivetti's death, and put an end to his vision for local computer manufacturing, all while IBM's presence in Italy was intensifying. Second, the turn of the decade saw a growth in socialist political movements, rapidly followed by a fracture within the left, which rapidly increased the distance (and the conflict) between parliamentary and grassroots politics.

Chapter 3, Inside the Black Box Entanglement, focuses on IBM's Italian branch as a site of technopolitical cultural production, to show the first encounters between the Black Box Entanglement and Italian socialist movements. Each section focuses on a representation of IBM, and its emotional significance.

The first section discusses the company's self-representation in its marketing practices. I focus on the marketing practices aimed at improving IBM's overall popularity and likability in Italy, not those directed at the business world. Three emotions were mobilized in this context, most significantly in connection with the macro-politics of computing. The local IBM management mobilized Fear of Falling Behind, establishing Technopolitical Resonance with its US counterpart and reinforcing the Black Box Entanglement. IBM's local communication division mobilized at times the Principle of Hope, and at times Scientific Curiosity. Their emotional practices countered the Black Box Entanglement. Until the early 1980s, these three emotions competed with each other, although not openly in conflict, fostering a re-politicization of computer debates. However, the mobilization of Fear of Falling prevailed afterwards, resulting in de-politicization.

The second section of Chapter 3 discusses IBM's representation by its labor unions. Here the Black Box Entanglement was openly challenged through the mobilization of Working Class Pride and Scientific Curiosity within labor unions' political practices. A re-politicization occurred, involving both computers' macro-politics and micro-politics. Labor unionists questioned the desirability of "IBM rationality" and criticized the company for importing computers to Italy that were designed as black boxes, therefore not fostering technological skill-sharing.

In the third section I discuss the company's representation by the so-called "armed party,"[121] the left-wing groups which chose armed struggle and political violence as key political practices. The mobilization of Working Class Pride shifted to Class Hatred. Revolutionary Fear and Revolutionary Trust were also key emotions. "IBM rationality" was again openly challenged, powerfully re-politicizing the macro-politics of computing. Whereas labor unionists wanted to open the black-boxed IBM computer, the "armed party" opted for its destruction, claiming that a different micro-politics of computing would not be possible. In this way, the emotional practices performed by the armed party ended up strengthening the Black Box Entanglement, resulting in a de-politicization of computer debates.

Chapters four and five, "against" and "outside" the Black Box Entanglement, discuss its significance in the re/de-politicization of computer debates in the Italian political traditions of "democratic socialism" and "libertarian socialism." The democratic socialists were "against" the Black Box Entanglement because their aim was to counter its influence at an institutional and cultural level: this meant taking over the *existing centers* of political and cultural power, shielding them from the influence of US capitalism, and promoting an alternative political model based on the "Italian road to socialism." The libertarian socialists were "outside" the Black Box Entanglement because they had a different set of political goals: establish *new centers* of political and cultural power, which also entailed rethinking the distribution and management of this power. These actors were not interested in competing in elections, nor in creating State-owned multinational computer companies like the democratic socialists. Their political practices were informed by principles like self-management, autonomy, and anti-authoritarianism.

These chapters are structured similarly, and serve two functions: first, they provide a more articulated layer of analysis on the Black Box Entanglement 's role in the de/re-politicization of Italian computer debates; second, they provide examples of how the computers' black-box could be

121 Giorgio Galli, *Storia Del Partito Armato* (Rizzoli, 1986).

broken, addressing at once its macro- and micro-politics. The Principle of Hopeful Curiosity was central in both cases, establishing Technopolitical Resonance among actors across time and political ideology.

Chapters 4 and 5 begin with the emergence of computer debates in the 1970s. A re-politicization of computer debates started when the Principle of Hopeful Curiosity's Technopolitical Resonance was amplified, through mobilizing emotional practices opposing the Black Box Entanglement. This mostly happened through research practice: computers were discussed at dedicated meetings, conferences, and on other knowledge-sharing occasions. Both the macro-politics and micro-politics of computing were discussed and re-politicized on these occasions, but mostly at a discourse level and the black-box was not yet broken. Furthermore, in this period, two de-politicizing processes happened: democratic socialists also mobilized a Socialist Fear of Falling Behind, countering (the capitalist) Fear of Falling Behind but also the Principle of Hopeful Curiosity; meanwhile libertarian socialists stopped discussing computers, which also produced a de-politicization because computers were not considered a politically interesting topic.

The central sections in chapters 4 and 5 focus on the re-politicization of computer debates at the macro-political level, in the first half of the 1980s. While the neoliberal "no alternative" and the reprisal of Cold War tensions fueled the Black Box Entanglement, the imminent (in)famous year "1984" was an occasion for both democratic and libertarian socialists to discuss how to craft a new utopia. In this period, computers featured more prominently in political practices, speeches, and meetings, and in cultural production practices, namely political magazines and newspapers. The Principle of Hopeful Curiosity's Technopolitical Resonance was amplified again, and on a much larger scale than before.

Chapters 4 and 5 provide two examples where the re-politicization of computer debates led to new political and technology practices. In both cases, the Principle of Hopeful Curiosity was central. In chapter 4, I focus on the Black Box Entanglement's criticism by socialist women. They re-politicized computer debates on both the micro and macro-political level, providing a gendered perspective on the Black Box Entanglement. Socialist women challenged the notion of "falling behind," and addressed structural problems influencing the gender gap in the computer sector. In chapter 5, I focus on the emergence of hacking as a political practice. The Black Box Entanglement was challenged through the Principle of Hope, Scientific Curiosity, Creative Anger, and Electric

Wit. Hackers materially broke the black-box, by providing a different macro-political vision and by showing it was possible to practice different micro-politics.

8. On music, memory, videos and archives: my empirical *thinking*

In this section I provide further details on how I conducted my "imbombegamento" (to practice resonance-methodology), and on the sources and archives constituting this dissertation's empirical base (to investigate Technopolitical Resonance).

My imbombegamento built on my existing knowledge and experience of socialist cultures and computer cultures in Italy, and was a continuous process throughout the four years of my PhD studies. A large part of this imbombegamento process involved reading primary and secondary sources, as my literature review, footnotes, and bibliography illustrate, and as further explained later in this section. I therefore start by discussing my non-written sources, that were specifically important for resonance-methodology.

A very important non-written source was music. Italy has a long-lasting and thriving political songwriting tradition, and music is a powerful vehicle of emotional expression. Since the late 19th century, Italian socialists have been incessantly singing about their values, their history, and their hopes. The fight against fascism, the rejection of capitalism, the inevitability of class war, the quest for individual and collective freedom, the practice of social conflict as a necessary and positive historical force, waiting for the "sol dell'avvenir" (the sun of the future): these issues were passed from generation to generation through songs. They constituted the back bone of a shared Italian political imagination, and a very valuable entry point to create resonance with historical actors, and understand which emotions mediated their political practices. While writing this dissertation, I often listened to Italian political songs spanning over a century:[122] from Pietro Gori's classical anarchist songs,[123] to the "pro-soviet punk" of CCCP-Fedeli alla Linea, along with WWII "Resistance Songs,"[124] 1970s feminist songbooks, the oral political history by the Nuovo Canzoniere Italiano,[125] anarchist singer-songwriter Fabrizio De André, and other politicized artists.

122 Two non-institutional but very well curated archives with texts and audios are "ilDeposito" on Italian political music (https://www.ildeposito.org/ accessed September 20, 2022.) and the international and multilingual database "Antiwar Songs" (https://www.antiwarsongs.org/ accessed September 20, 2022.).

123 Marco Manfredi, *Emozioni, Cultura Popolare e Transnazionalismo: Le Origini Della Cultura Anarchica in Italia (1890-1914).* (Le Monnier, 2017).

124 Antonio Virgilio Savona and Michele Straniero, *Canti Della Resistenza Italiana* (Rizzoli, 1985).

125 Cesare Bermani, *Una Storia Cantata, 1962-1997: Trentacinque Anni Di Attività Del Nuovo Canzoniere Italiano-Istituto Ernesto De Martino* (Jaca Book, 1997).

Another occasion for resonance other than written texts, came from a fortunate coincidence. I happened to be writing this thesis in a period of many celebrated anniversaries. Every new decade, the years ending with a 7, 8, 9 and 0 prompt the remembrance of key events in Cold War Italian politics.[126] Conferences and events are organized on these anniversaries. I was lucky that my second home during my PhD has been Bologna, where these celebrations are always strongly felt. I had the opportunity to participate in these events, as a "participant observer" while the memory and feeling-thought of the period are shared and transmitted.[127]

Though I did not use these sources extensively, visual materials were also important to create resonance and understand past emotional experiences. The "Archivio Audiovisivo del Movimento Operaio e Democratico" (Audiovisual Archive of the Workers Democratic Movement)[128] provides many interesting glimpses into political life at the time. The national television service RAI produced many interesting documentaries with historical footage about cultural, social, and political life in 20th century Italy.[129] These visual sources powerfully show the emotional involvement created at big political events in Italian socialist culture, from the large crowds of students and workers marching together against the Vietnam War, to middle-aged ladies in flowery dresses proudly raising their fists in the air after a speech by Italian Communist Party secretary Enrico Berlinguer.

For the main part of my empirical work, researching emotional practices and their Technopolitical Resonance, I used textual sources retrieved from online and physical archives, libraries, and second-hand bookshops. Although Covid-19 mobility restrictions prevented me from accessing some archives I had planned to visit, I overcame this problem by focusing on other aspects. Furthermore,

126 In 1977 and 1968, the two biggest grassroots socialist movements in post-WWII Italy emerged; 1969 and 1980 mark the beginning and end of the "Strategy of Tension." On August 2, 1980, Bologna's central station was bombed and on December 12, 1969 Piazza Fontana in Milan was bombed, shortly followed by the death of anarchist Giuseppe Pinelli while in police custody. The event symbolically marked the distancing of grassroots left, making 1969 an even more fundamental date.

127 I started my PhD during one of the 1977 anniversaries and the topic was often discussed in Bologna. In 2018, I attended several conferences in Bologna celebrating the 50th anniversary of the 1968 protests around the exhibition "Non è che l'inizio: tracce del '68 negli archivi bolognesi." See: http://www.archiviodistatobologna.it/sites/default/files/ASBO/allegati/novit%C3%A0/Non_%C3%A8_che_linizio_invito.pdf. For the 2019 anniversary of Piazza Fontana and Pinelli's death, I attended initiatives organized by the documentation centers in Bologna. See: https://www.centrodoc-vag61.info/50-anni-da-piazza-fontana-50-anni-di-stragi-di-stato/. For the August 2020 initiatives, see: https://www.assemblea.emr.it/cantiere-due-agosto, and https://staffetta.noblogs.org/post/2020/07/31/bo-sappiamo-chi-e-stato-domenica-2-agosto-tutte-e-tutti-in-p-zza-nettuno-alle-ore-9-15/ (all webpages were accessed on September 20, 2022).

128 The archive has video and audio materials produced by the PCI. See: https://www.aamod.it/, accessed September 20, 2022.

129 See the series: "La storia siamo noi" (1997-2013).

I conducted formal and informal interviews with historical actors, though not systemically, to gain a clearer picture of events. Oral histories could have been an opportunity to investigate "communicating emotional practices." However, I decided against this methodology. Firstly, because it was not possible to systematically perform interviews across the different groups discussed here.[130] Secondly, the emotions felt when remembering an event in the past might differ from the emotions felt while actually taking part in an event.

Chapter 1 is mostly based on published academic literature on the History of Computing in the United States. For my analysis of "computerphobia" and related concepts, I used online archives of Behavioral Sciences journals and digitized materials from ERIC, the US government's online library of educational materials.

Chapter 2 is based on two kinds of sources. One is literature by and about Antonio Gramsci, Errico Malatesta, and Adriano Olivetti, accessible through several online and physical libraries. The other is magazines and newspapers by 1960s grassroots socialist movements. I retrieved these from the digitized collection at the Primo Moroni Archive, an independent archive of Milan's social movements, and from the digitized collection at Biblioteca Gino Bianco, a library specializing in Italian political history.

My work on IBM in chapter 3, is based on three different sources. To analyze the company's self-representation, I relied on the company magazine "Rivista IBM" and a series of non-technical, outreach publications. I found these sources in libraries and second-hand bookshops. The *Rivista IBM* collection was not complete but still sufficient for my purposes. I could not access a more complete collection due to technical problems at a local library and Covid travel restrictions. Regarding IBM labor unions, I relied on archival material digitized by the IBM Vimercate unions, and I conducted one extensive, semi-structured interview with current and former unionists and archive curators. To find out about the relationship between IBM and the "armed party," I used books and magazines containing interviews with "armed party" members and their political communications. I retrieved these sources from libraries, second-hand bookshops, and the Primo Moroni Archive.

To investigate "democratic socialism" (chapter 4), I focused on the Italian Communist Party (PCI), and included perspectives closer to the "dissident" group "il manifesto" and to feminist and

130 My attempts to contact former members of IBM Italia communication division failed.

women's movements. Several socialist political parties existed in 20th century Italy.[131] I chose to focus on the Italian Communist Party because overall, in the 1960s-1980s period, it was the most relevant from an international perspective, and the most active in fostering debates on computers. I conducted extensive archival research at the "Archivio Gramsci Emilia Romagna" in Bologna, on three main types of documentation: about National Congresses; initiatives that could be related to computers (conferences on science and technology, or on education and public administration); women's initiatives (at national and local levels). This archive stores materials from the PCI Emilia-Romagna regional section and the Bologna provincial section. This is a regional archive, yet is one of the biggest PCI archives in Italy, in a region where the party's presence was particularly strong. The boxes containing National Congress materials were rich and provided enough documentation to understand the main themes debated. Covid-19 travel restrictions prevented me from visiting the main PCI archives in Rome. I also extensively used the PCI newspaper *l'Unità's* online archive; books on computers by PCI members and intellectuals close to the PCI, retrieved in second-hand bookshops and libraries; and I had four semi-structured interviews with Marxist computer scientist and essayist Paola Manacorda.

Moving to the "libertarian socialism" site (chapter 5), I decided to focus on a Milan-based anarchist group, initially known as Federation of Anarchist Groups (Gruppi Anarchici Federati, GAF), as they significantly contributed to the intellectual and cultural life of Italian anarchism after WWII. The final section of the chapter focuses on punk youth cultures and the emerging Social Centers (Centri Sociali) movement,[132] crucial for the genesis of left-wing grassroots hacking cultures. As with the case of socialist political parties, I could not include all the libertarian socialist groups and movements operating in Italy. I did not look extensively into the historical Italian Anarchist Federation (Federazione Anarchica Italiana, FAI) and its weekly newspaper *Umanitá Nova*, a key anarchist publication in Italy. My early research into FAI sources did not find relevant discourses, and both colleagues and former *Umanitá Nova* contributors pointed at a similar situation in the newspaper. I also decided not to focus extensively on Autonomist Marxism (Autonomia) and Workerism, which were key socialist movements in the 1970s and are still very influential today.[133] Including them as one of the main actors in my research meant taking a closer look at labor unions,

131 For example the Italian Socialist Party (Partito Socialista Italiano, PSI), the Italian Socialist Party of Proletarian Unity (Partito Socialista Italiano di Unità Proletaria, PSIUP), Proletarian Unity Party (Partito di Unità Proletaria, PdUP), Proletarian Democracy (Democrazia Proletaria, DP).

132 Mudu, Pierpaolo. "At the intersection of anarchists and autonomists: Autogestioni and Centri Sociali." *ACME: An International Journal for Critical Geographies* 11, no. 3 (2012): 413-438.

133 See works by Antonio Negri, a "founding father" of autonomist marxism. For example: Michael Hardt and Antonio Negri, *Empire* (Harvard University Press, 2000); *Multitude: War and Democracy in the Age of Empire* (Penguin Press, 2004).

because autonomist and workerist movements were often in conflict with them. This would have inevitably steered my dissertation towards Labor History, and I did not have the time, nor the competence to embark on that task. I did, however, focus on some parts of Bologna-based Autonomia, because this was a very recognizable group and fundamental for social movements' computer debates.

I extensively researched magazines, books, fanzines and other printed cultural products by left-libertarian movements and authors, looking for traces of discourses on computers. I conducted a significant part of my archival work in the "Centro di Documentazione dei Movimenti Francesco Lorusso - Carlo Giuliani" in Bologna. This archive contains materials from left-wing social movements, with a specific focus on the Bologna Autonomia. However, this is the less "visible" part of my archival research: perhaps the most important insight I gained there is that computers were not discussed much until the late 1970s/early 1980s. I also corresponded with the "Centro Studi Libertari Giuseppe Pinelli" in Milan. This independent research and documentation center was set up by the GAF in the 1970s, and is an important source for the Italian history of anarchism today. I did not perform archival research there, but the archivists helped me contextualize the materials I did find, and pointed to additional sources. Also in this case, an important point was the scarcity of materials specifically addressing computers. I visited the archives of anarchist intellectual and former Olivetti employee Carlo Doglio, hosted in the "Biblioteca Libertaria Armando Borghi" in Castel Bolognese. There, I consulted documents on his work as an editor for Olivetti to gain a better understanding of his involvement in the company. The "Circolo Anarchico Berneri" library and archive in Bologna are a precious resource to retrieve anarchist press items and books. The complete collection of the "A-rivista anarchica" magazine, founded by the GAF, is digitized and I accessed it online. The online archive "Grafton9" specializing in 1990s Italian countercultures, was a fundamental resource for the final section of this chapter, as well as the punk zines digitized by publishers Agenzia X, and the Primo Moroni archive's digitalized collection. I also had informal conversations with people who took part in 1970s and 1980s libertarian movements.

9. On Resonance, emotions, thoughts, and experience: my empirical *feeling*

Finally, I elaborate on Resonance-methodology: how did I establish Resonance with my sources at an "emphatic understanding" level, with the Wikan methodology, and in what way have emotions been an epistemic tool for my PhD project.

Regarding the Resonance between myself and my sources: most of this dissertation is based on Italian socialist culture, and I had an advantage in analyzing this "cultural field" for two reasons: One, I have lived in Italy for most of my life; two, I have also been exposed to this specific side of Italian culture. A significant part of this exposure was through my feminist education and my engagement with feminist practices: in Italy (and elsewhere) the history of the feminist movement is tied to the "New Left." Thus, I was familiar with many of my actors' debates and political practices.

These statements might be questionable regarding reproducibility and biases. About reproducibility: anyone not exposed to Italian socialist culture like myself could certainly conduct this research in the same way. I only used published materials, and I did not have any privileged access to sources through personal connections. In this sense, my advantage is mostly related to previous knowledge in my field. About bias: my exposure to Italian socialist culture has not been restricted to a specific ideological tradition and I have never been a member of any political party. Furthermore, having experienced this culture through a feminist lens has been an advantage for critically assessing the historical actors' grand claims. My most recent political engagement before starting my PhD was in the Wikimedia Movement,[134] which is not even perceived as "political" by many of its participants. The relationship between knowledge and power has always interested me: this is certainly a fundamental point where my politics and my work as a researcher converge. From this perspective, I am biased in favor of Free and Open Source Software, because it favors decentralization, and therefore democratization, of techno-scientific knowledge. But my claims are based on the existing literature and my biases relate to which actors and themes I chose to investigate. This does not diverge significantly from every researcher's inevitable bias. If anything, regarding the history of computing, my bias will help to counterbalance the most represented biases in the field: in its early years, writing the academic history of computing were US-based former computer professionals, and scholars from a STEM[135] background, or who had ties with the computer industry. Things have changed in recent decades but, as I observed above, the field still has a blind spot regarding Free and Open Source Software.

Moving on to Resonance-methodology: a possible limitation was that I did not establish the same intensity of Resonance in all the geographical sites I investigated. Resonance requires time and physical presence: although I have been exposed to US culture since I was a child, like many

134 This movement supports Wikipedia and its sister projects.
135 Science, Technology, Engineering, Mathematics.

Europeans, several aspects of US culture and society are not familiar to me. But I did not want to focus too much on the USA, and this limitation does not hinder my argument. My analysis of US computer debates did not aim to offer a detailed picture of the local context. My interest was to establish whether the concept of Black Box Entanglement had an empirical basis, and whether it played a role in the de-politicization of computer debates. And I do not claim that the Black Box Entanglement was "the only" relevant technopolitical feeling-thought in Cold War USA, or that it was "the most relevant." Several other emotions were certainly significant in shaping computer debates and design in the USA, but I leave this investigation to other scholars. Furthermore, establishing Resonance does not mean "acquiring the same worldview of actors": although I feel distant from the specific values and concerns which animated and reproduced the US military-industrial complex "Closed World,"[136] I can understand emphatically what is going on, because similar "closed worlds" have also started out from very different political values and ambitions.

Focusing on Italian sources, an important entry point for establishing Resonance was the fact that I was already familiar with the history and cultural practices. As my aim was to provide an actor-centered perspective, I also paid particular attention to my actors' specific concerns, read first-person accounts, and used as much as possible their language and framing of themselves and other socialist groups. This helped me "create a space of understanding" based on feeling-thinking. But a crucial aspect in Italy's post-WWII socialism history is that it is full of conflicts, divisions, and accusations of having diverged from the right path to socialism. This presented a challenge in establishing Resonance, because I have learned about these divisions, and seen how they mattered to historical actors, so that I could understand them. But I could not really feel-think them: my understanding was based on a "traditional" intellectual process, having read, analyzed, and processed sets of information. Which emotions led the PCI to foster marginalization (at times even criminalization) of the grassroots left, and which emotions led the grassroots left to see the PCI as its enemy?

One episode in my life helped me achieve a deeper emotional understanding of the feeling-thoughts involved in this division, which I recall to exemplify how emotions have an epistemic function. About 10 years ago, I inadvertently ended up in a Neo-Nazi meeting. I went with a friend to a pub where I'd been before: a regular place, where many students and local youths went. I immediately noticed that the crowd was different from the usual. Then one stood up, raised his arm towards the ceiling and shouted words I do not wish to repeat. Then they all did the same. At first, it felt unreal.

136 Edwards, *The Closed World*.

Like a scene from the movie American History X.[137] This was not the first time in my life, nor the last, I saw a group of people performing a Nazi salute in public: the apology of fascism is a criminal offense in Italian law, yet institutions too often turn a blind eye. I too had experienced feelings of "hatred" and "fear" of fascism, similar to my actors. But this experience was different from any other, because I felt part of a very small group (me, my friend, and a few other non-Nazi people in the pub, unaware spectators) witnessing a horrific, unacceptable form of violence being glorified, and performed, right in front of us. Mine was a very minor experience compared to what happened in 1970s Italy: the violence I witnessed in that moment did not involve physical violence against me or other pub guests. And, both now and in the past, many people cared about preserving, in different ways, the anti-fascist values on which the Italian Constitution is based. But at that particular moment, these people were completely irrelevant: I felt it was just me, my friend, and the Neo-Nazis. This feeling helped me understand the divisions within the left: in the 1970s, many groups spoke and acted as if they alone were witnessing fascist violence.

Conversely, at times it proved much more difficult to establish Resonance precisely with those actors who were closer to my own experience. In the first draft of my dissertation, section 4.3 focusing on women and computers hardly mentioned emotions. And the same happened in the following draft. Had I discovered that emotions were not so central for socialist women, as anthropologists had speculated about the Balinese people?[138] No, I was just stopping myself from establishing Resonance, because I did not want to fuel my existing bias. My emotions helped me understand this, when I organized a workshop on feminism and technology in non-academic settings. I found myself surprised at the number of women who attended, and I immediately thought about how that same surprise was reported by 1980s women. I realized that I could not escape from the Resonance I already felt with them, I only had to embrace it, and look into my own feeling-thinking. I read my draft again, and realized two things. One, I had performed a mobilizing emotional practice, by introducing the section with facts and figures attesting how sexism is a profound and long-lasting problem in Italian culture. Two, my emotional practice was based on anger, the same anger that had evoked women's computer debates. While making excessive efforts to keep my bias in check, I had not immediately recognized this shared emotion, because the key theme of housework in the debates I had analyzed no longer has the same centrality in contemporary feminist debates. But I know the feeling that informed those past debates. It is the anger which comes from living in a cultural and societal environment that reminds you all too often,

137 American History X is a movie about current Neo-Nazi groups in the USA. https://en.wikipedia.org/wiki/American_History_X accessed September 20, 2022.
138 Wikan, *Managing Turbulent Hearts.*

in more or less subtle ways, that you are indeed "the second sex."[139] This also occurs in left-wing, or otherwise "progressive" political movements. This feeling motivates women to have their own spaces for discussion, and create their own political practices. So there it was: Creative Anger. Theirs, and mine.

Finally, a general note on the epistemic significance of emotions during this study. When I started to investigate the role of fear in the history of computing, I could not know that a pandemic would break out in a couple of years. During the pandemic, I personally experienced how fear mongering works, particularly through news outlets. It was not the first time I had witnessed this happening on the news, but I was usually able to recognize and critically address this process from the outside. This time, however, it took some time to see it. And even when I realized there was a lot of news-cycle induced fear mongering, it took some time to shake off some of the "unjustified" fear. My experience of how newspapers generate panic was an important learning moment. When I perceived how my own fear was increased by the media talking about fear, this led me to seriously question the reliability of news as source to examine people's fears. To what extent have similar processes influenced research on fear and technology? Have news outlets ever reported on "existing" fear, or are these fears always "manufactured," or somehow exaggerated, because of the news industry business model?

The concept of "Technopolitical Resonance" can help in assessing the actual societal and cultural significance of a certain fear (or other emotion), because it requires us to think harder about the actors engaged in its public performance, and the impact of this performance.

139 Simone De Beauvoir, *The Second Sex*, trans. Constance Borde and Sheila Malovany-Chevallier (Random House, 2009).

Chapter One

The Black Box Entanglement and its Discontents:

Competing Technopolitical Resonance in Cold War USA

And always happy we have to be
For our tears hurt the King
They hurt the gentry and the Cardinal
Who become sad if we cry

"I saw a king," Dario Fo (1968)[140]

"There's a time when the operation of the machine becomes so odious, makes you so sick at heart, that you can't take part!"[141] It was December 2, 1964, and from the steps of Berkeley's Sproul Hall, a curly-haired philosophy student uttered statements which made history. He was Mario Savio, a leading figure in the Free Speech Movement. "You can't even passively take part!" he famously continued, "And you've got to put your bodies upon the gears and upon the wheels... upon the levers, upon all the apparatus, and you've got to make it stop! And you've got to indicate to the people who run it, to the people who own it, that unless you're free, the machine will be prevented from working at all!"[142] The so-called "Body Upon Gears" speech came to symbolize 1960s US Counterculture.[143] The Counterculture movement's themes ranged from criticizing the misuse of science and technology, to the advancement of civil rights and reconfiguration of gender norms, amid the rejection of capitalism and the quest for alternative forms of living, political engagement, and technology development.[144]

Unsurprisingly, these arguments clashed with the US government's Cold War ambitions to establish a global, technologically advanced capitalist society. Two years after Savio's speech, in 1966, the

140 "E sempre allegri bisogna stare // Che il nostro piangere fa male al re // Fa male al ricco e al cardinale // Diventan tristi se noi piangiam". Sung by a peasant, this is a satire on feelings of greed. Those who hold political or economic power, when forced to relinquish a small part of that power, complain copiously. Peasants on the other hand, must always look happy and may never express negative feelings about their situation.

141 Mario Savio in Robert Cohen and Reginald E. Zelnik, eds., *The Free Speech Movement: Reflections on Berkeley in the 1960s* (University of California Press, 2002), 119.

142 Savio, in Cohen and Zelnik, 119.

143 Theodore Roszak famously described this term in: *The Making of a Counter Culture: Reflections on the Technocratic Society and Its Youthful Opposition* (Doubleday, 1969).

144 For the increasingly participatory vision emerging on the societal significance of technology, see: Ruth Oldenziel, Erik van der Vleuten, and Mila Davids, *Engineering the Future, Understanding the Past: A Social History of Technology* (Amsterdam University Press, 2017) 131-63. On the US context, see: Matthew Wisnioski, *Engineers for Change: Competing Visions of Technology in 1960s America* (MIT Press, 2012).

National Commission for Technology, Automation and Economic Progress pointed out "the ill-defined drive toward a new value system, symbolized by the student revolts at Berkeley and elsewhere," as a source of current concern for the educational system.[145] Similar claims supported the idea that there was a widespread societal problem regarding people's responses to technological innovation, particularly computers. From the 1970s, the study and improvement of people's attitudes toward computers became a popular research theme in the Behavioral Sciences, centered on concepts such as "computer attitudes," "computer anxiety," "computerphobia," and "computer addiction" (from now on abbreviated as "CAP").[146] In CAP research, feelings of dehumanization or depersonalization induced by computers became symptoms of irrational fears or anxieties, while an enthusiastic acceptance of computers was seen as the appropriate and rational attitude. In other words, the indicators for fearful and anxious computer attitudes evoked criticism of technological development driven by the Counterculture.

But what Savio called the "sickness of the heart" in 1964 was not only a matter of fear or anxiety. It encompassed anger, disappointment, disillusion, even hatred ("the machine becomes so odious").[147] And it was not an "irrational" response, only circumscribed to students and activists: from Norbert Weiner to Joseph Weizenbaum, several scientists, engineers, researchers, and intellectuals had expressed concerns over the misuse of technology through history, often putting forward similar arguments to the 1960s Counterculture.[148] Savio's "sickness of the heart" highlighted a series of historically meaningful and socially relevant technopolitical feeling-thoughts.

CAP research is therefore more interesting for investigating the fears of those who promoted computers, than the fears of those who avoided them. Indeed, as social psychologist Martin Bauer and media studies scholar Lori Reed have pointed out, CAP research ultimately fostered the "medicalization"[149] and "normalization"[150] of people's attitudes to computers rather than increase

145 James D. Finn, "The Emerging Technology of Education," in National Commission on Technology, Automation and Economic Progress, *Technology and the American Economy. Educational Implications of Technological Change*, Appendix, Volume IV (Washington 1966). 34. On the negative depiction of the Counterculture by technology supporters, see Wisnioski, *Engineers for Change*. 5-6.

146 "CAP" stands for "Computer Attitudes, Anxiety, Addiction and Phobia." I combined all words starting with "A."

147 David P. Julyk, "'The Trouble With Machines Is People.' The Computer as Icon in Post-War America: 1946-1970." (The University of Michigan, 2008). Doctoral dissertation.

148 Wisnioski, *Engineers for Change*; Zachary Loeb, "The Lamp and the Lighthouse: Joseph Weizenbaum, Contextualizing the Critic," *Interdisciplinary Science Reviews* 46, no. 1–2 (2021): 19–35; Norbert Wiener, *Cybernetics. Or: Control and Communication in the Animal and the Machine.* (MIT Press, 1961).

149 Martin Bauer, "'Technophobia': A Misleading Conception of Resistance to New Technology," in *Resistance to New Technology* (Cambridge University Press, 1995), 97–122.

150 Lori Reed, "Domesticating the Personal Computer: The Mainstreaming of a New Technology and the Cultural Management of a Widespread Technophobia, 1964–," *Critical Studies in Media Communication* 17, no. 2 (June 2000): 159–85; Lori Reed, "Governing (through) the Internet: The Discourse on Pathological Computer Use as

the understanding of what drove them further from or closer to this new technology. In particular, I argue, the CAP research assumptions and design echoed the US military-industrial complex fear of falling behind the Soviet Union in the Cold War. The concern was that if people did not have the appropriate attitude towards computers, this would therefore hinder the establishment of a technologically advanced capitalist society countering the menace of communism.[151]

In this chapter I present the genesis of CAP research as marked by a series of interconnected emotional practices centered around the Black Box Entanglement. Black boxed computer technologies were promoted under the threat of "falling behind" the upcoming "Computer Age," intended as a technologically advanced capitalist society. Emotional practices based on the Black Box Entanglement established Technopolitical Resonance between the Cold War military-industrial complex and CAP researchers. In other words, there was a connection between these historical actors based on their emotional and intellectual attitude towards a politically informed technology vision. On the macro-political level, CAP research translated Cold War geopolitical anxieties and ambitions into concerns of the individual sphere: correcting an inappropriate computer attitude was fundamental to not falling behind society as a person. On the micro-political level, having an appropriate computer attitude did not necessarily entail knowing how computers actually worked. In fact, how computers were designed was not seen as a potential reason for people's negativity. Furthermore, being too inquisitive about how computers functioned could also be a symptom of an inappropriate attitude: no longer fear or anxiety, but addiction. CAP research did not account for the existence of alternative political reflections and practices regarding the use and design of computers, and legitimate arguments were reduced to symptoms of emotional and/or rational malfunctioning. In this way, the Black Box Entanglement, echoed through CAP research, served to marginalize critical perspectives on the societal and political consequences of computer developments, fostering a de-politicization of public computer debates.

Mobilized Knowledge," *European Journal of Cultural Studies* 5, no. 2 (May 2002): 131–53.

151 These concerns were frequent in the history of computing. For example, 1950s' "automation anxiety" prompted the US military-industrial complex to finance educational, industrial, and documentary films aimed at improving public attitudes toward computers. Logan Brown. "Learning to Love Computers: Useful Cinema and the Mediation of American Computing, 1958–62." *Technology and Culture* 63, no. 3 (2022): 665-688.

1.1 From the Sputnik to Computer Assisted Instructions. Mobilizing fear in the Closed World

By the end of the 1980s, more than 300 research papers and dissertations had been published on computerphobia and computer anxiety, mostly focusing on the US context.[152] However, identifying a "Computerphobic Personality," a specific set of demographic and psychological correlates, proved difficult.[153] CAP research was informed by a recognizable macro-politics of discourse on how both technology and society should work. Whereas it was not clear why people were "computerphobic," it was clear why they presented a problem: the computerphobic would fall behind the technologically advanced capitalist society being built in the USA. The computers promoted through this Fear of Falling Behind were also intended as black-boxes, thus were based on a distinct micro-politics. Ultimately, the emotional practices performed through CAP research were heavily informed by the Black Box Entanglement. I first take a look at the macro-political implications of CAP research, and discuss the micro-political aspects in section 1.4.

On the macro-political level, I claim that the Black Box Entanglement relied on what Paul Edwards has defined as the "Closed World discourse." This was "the language, technologies, and practices that together supported the visions of centrally controlled, automated global power at the heart of American Cold War politics."[154] The Closed World discourse developed within the US military-industrial complex was driven by Cold War rivalry, particularly the notion of "containment." Edwards identified the Closed World discourse's three main goals: "enclosing the Soviet Union"—depicting it as incompatible with democratic values; "enclosing the capitalist nations"—protecting them from external forces and ideas; "enclosing the entire world"— unifying it under the guidance of US capitalism. Technological progress, specifically technological superiority over the USSR, was seen as one of the key factors for fulfilling these goals.

I argue that the Fear of Falling Behind formed the core of a mobilizing emotional practice aimed at convincing US citizens about the desirability of the Closed World. Notably, the military sector's large computer projects were often justified by the need to keep up with Soviet military power. This was the case with the 1950s/1960s SAGE (Semi-Automatic Ground Environment), a computerized

152 Bauer, *"Technophobia"*

153 Larry D. Rosen and Phyllisann Maguire, "Myths and Realities of Computerphobia: A Meta-Analysis," *Anxiety Research* 3, no. 3 (1990): 175–91.

154 Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (MIT Press, 1996; paperback ed., 1997), 7.

radar network to intercept Soviet missiles. Similarly, the 1980s Strategic Defense Initiative was presented as a defense measure at a time of renewed Cold War hostility.

Fear of Falling Behind was also mobilized to promote the use of computers in civic society. The Education sector was often the target of fearful narratives on the consequences of US technological backwardness.[155] The Sputnik's successful launch in 1957 generated massive debates on the need to increase technology skills in the future US workforce. A well-known outcome of these debates is the 1958 National Defense Education Act (NDEA).[156] The NDEA enforced funding and initiatives to foster technology education in US schools, framed as a matter of national security. In 1983, amid the reprisal of Cold War tensions, the US government published a report on technology and education "A Nation at Risk. The Imperative for Educational Reform."[157] Similar to the NDEA Act, the report mobilized the fear of falling behind because it warned about US students not receiving enough technology education, and was a catalyst for adopting computers in schools.

Mobilization of the Fear of Falling Behind also increased quantitative studies on people's attitudes toward computers. From the late 1950s, understanding these attitudes increasingly became a key factor for advancing Closed World ambitions. To not fall behind the Soviet Union, the entire US population needed to improve their technical skills and their appreciation of technology. Moreover, thanks to computers, people's progress could be efficiently monitored and measured.

The education sector became a key site of interest for research on computer attitudes. The 1958 NDEA also promoted the use of standardized tests to measure students' technology attitudes and skills. In the 1960s and 1970s, several studies assessed students' and teachers' attitudes toward Computer Assisted Instructions (CAI). These CAI studies, although not yet formalized as a specific research methodology and mostly circulated within the heterogeneous community involved in educational technologies, set the path for developing Computer Attitudes research. A typical study on CAI attitudes involved participants filling in a questionnaire indicating their level of agreement with a list of statements about computers and their experience with them. For example: "While on Computer Assisted Instruction, I encountered mechanical malfunctions," or "The Computer

155 Kathleen Anderson Steeves et al., "Transforming American Educational Identity after Sputnik," *American Educational History Journal* 36, no. 1/2 (2009): 71; John Benedicto Krejsler, "The 'Fear of Falling behind Regime' Embraces School Policy: State vs Federal Policy Struggles in California and Texas," *International Journal of Qualitative Studies in Education* 31, no. 5 (May 28, 2018): 393–408.

156 85th U.S. Congress. *National Defense Education Act*, September 2, 1958. Washington, DC.

157 National Commission on Excellence in Education, "A Nation at Risk: The Imperative for Educational Reform," *The Elementary School Journal* 84, no. 2 (1983): 113–30.

Assisted Instruction situation made me feel quite tense."[158] The questionnaires were often handed out after direct exposure to computers in Computer Assisted Instruction programs. These studies were meant to test the efficacy of CAI and assess whether students' attitudes improved or not after the experience. Other CAI studies focused only on teachers, investigating their disposition towards the use of computers as educational tools.

After the mid-1970s, an increasing number of behavioral scientists became interested in studying people's attitudes towards computers. The focus on "Computer Assisted Instructions" expanded to "Computers" in general: this was the birth of CAP research. Interest in CAP research increased with the reprisal of Cold War tensions during Reagan's presidency, peaking in the mid-1980s.[159] Then the US Department of Education also funded a "Computerphobia Reduction Program."[160]

CAP studies had the same structure as CAI attitude studies and the surveys with statements on computers were often conducted with students or people involved in education. The same fear of falling behind mobilized in CAI research, was also central in CAP research. The rationale behind CAP research was that negative or fearful computer attitudes could ruin someone's current and future opportunities in life, and even threaten the entire country. For example, computer anxiety could lead to a significant loss of job opportunities,[161] damage women's careers,[162] "be detrimental to [a person's] performance in society,"[163] or cause a widespread loss in productivity.[164]

But CAP studies also introduced two new elements to the research on people's attitudes towards computers: first, a growing interest in negative attitudes, which started to be called "computer anxiety" or "computerphobia;" second, an increased formalization of the research topic, which also

158 Samuel M. Long and C. Alan Riedesel, *Use of Computer Assisted Instruction for Mathematics In-Service Education of Elementary School Teachers. Final Report*, 1967, https://eric.ed.gov/?id=ED089791.

159 Bauer identified 1984 to1986 as the first peak years in CAP research, in "*Technophobia,*" 100.

160 Michelle M. Weil, *Computerphobia Reduction Program: Clinical Resource Manual* (California University Press, 1988); Michelle M. Weil, Larry D. Rosen, and Deborah C. Sears, "The Computerphobia Reduction Program: Year 1. Program Development and Preliminary Results," *Behavior Research Methods, Instruments, & Computers* 19, no. 2 (1987): 180–84.

161 Jo N. Campbell and Judith E. Dobson, "An Inventory of Student Computer Anxiety," *Elementary School Guidance & Counseling* 22, no. 2 (1987): 149–56. Robert K. Heinssen, Carol R. Glass, and Luanne A. Knight, "Assessing Computer Anxiety: Development and Validation of the Computer Anxiety Rating Scale," *Computers in Human Behavior* 3, no. 1 (1987): 49–59. Michelle M. Weil, Larry D. Rosen, and Stuart E. Wugalter, "The Etiology of Computerphobia," *Computers in Human Behavior* 6, no. 4 (1990): 361–79.

162 Gary S. Nickell and John N. Pinto, "The Computer Attitude Scale," *Computers in Human Behavior* 2, no. 4 (1986): 301–6.

163 Matthew M. Maurer and Michael R. Simonson, "Development and Validation of a Measure of Computer Anxiety" (Annual Meeting of the Association for Educational Communications and Technology, Dallas, Texas, January 20-24 1984), 320. https://eric.ed.gov/?id=ED243428 Accessed September 20, 2022.

164 Ella Paton Gardner, Peg Young, and Stephen R. Ruth, "Evolution of Attitudes toward Computers: A Retrospective View," *Behaviour & Information Technology* 8, no. 2 (April 1989): 89–98.

reinforced popular narratives on computerphobia. The notion of computerphobia became popular beyond academia: in the 1980s, self-help books and magazines published articles on the topic.[165] In parallel, courses to overcome computerphobia were organized in the USA. Social psychologist Martin Bauer argued that because research on computerphobia was widely popular, it can be framed as "a case of popular agenda setting that leads to a scholarly exercise."[166] Here, I focus on the institutionalization of this concept through CAP research.

1.2 From Computer Assisted Instructions to Computerphobia: naming computer criticism "fear of computers"

In the 1980s, researchers interested in the "negative" attitude towards computers increasingly called this "computerphobia" or "computer anxiety." Behavioral scientists produced formal definitions of these terms, no longer referring to generic concepts of "fear" or "anxiety" but "naming" a new emotion. This naming emotional practice amplified the Technopolitical Resonance of the Black Box Entanglement. The term "computerphobia" stemmed from the clash between the technopolitical feeling-thoughts of the Closed World (the Black Box Entanglement) and those of the emerging Counterculture. "Computerphobia" normalized the Closed World's feeling-thoughts and medicalized the Counterculture's.

From the late 1960s, the Counterculture directly opposed the US military-industrial complex and its vision of a technologically advanced capitalist society. A well-known example of this opposition was when US university students sabotaged IBM punched cards.[167] This practice was famously associated with the creative appropriation of the warning "do not fold, spindle or mutilate" printed on IBM cards. Students used slogans such as "I am a human being, do not fold, spindle or mutilate me!" or would actually "fold, spindle and mutilate" the IBM data storage cards during political demonstrations.[168]

However, the Counterculture never suggested a total rejection of technology. On the contrary, there are many examples of intersections between the Counterculture and the history of computing. For

165 Reed, "Domesticating the Personal Computer," 174.
166 Bauer, "*Technophobia,*" 110.
167 Steven Lubar, "'Do Not Fold, Spindle or Mutilate': A Cultural History of the Punch Card," *The Journal of American Culture* 15, no. 4 (December 1992): 43–55.
168 Lubar.

example, Countercultural education innovators like Ivan Illich[169] and Paulo Freire[170] were not averse to using the technology as an educational aid.[171] Illich's notion of "Tools for Conviviality" influenced personal computing pioneer Lee Felsenstein. More generally, the Counterculture's criticism of technology also stemmed from engineers' concerns regarding the misuse of technology: Felsenstein was not the only technology expert establishing Technopolitical Resonance with Counterculture's activists instead of Closed World's generals. The exchanges between the Counterculture and the techno-scientific world were actually numerous and fruitful.[172]

Although the Counterculture opposition to the Black Box Entanglement also mobilized fear, this was not a mere "fear of technology," but rather the fear of how technology is misused. This fear was informed by literature on the social and political consequences of technological development, for example works by Jacques Ellul and Lewis Mumford,[173] and fueled by Cold War events and concerns. The "technocratic" use of technology was envisioned as potentially detrimental on two levels. First, it could cause incredible damage on a global geopolitical scale (such as war, or in the worst-case scenario, nuclear annihilation). Second, it could cause feelings of "depersonalization" and "dehumanization" at the individual level. This criticism inevitably clashed with Closed World ambitions, generating two competing emotional practices, both centered on mobilizing fear: on the one hand, the CAI-CAP's fear of falling behind the Closed World, which strengthened the Black Box Entanglement; on the other hand, the Counterculture's "Fear of Falling Inside" this world, which weakened the Black Box Entanglement.

Education became a key site in this clash. Many supporters of Educational Technologies, including CAI, dismissed the Counterculture's arguments about the "fear of falling inside the Closed World" as a "fear of technology." Negative critique of the Counterculture, including accusations of being "fearful of computers," were sometimes very explicit. In 1981 and 1982, Allen Schmieder, director of the US Department of Education's Teacher Centers division, opened his speech at the annual national conference with "the doomsayers [warning us] that machines were going to take over and their mad creators would find new ways to spindle and mutilate us."[174] Other references to

169 Ivan Illich, *Deschooling Society* (Harper & Row, 1971); and *After Deschooling, What?* 1973, 1–28.

170 Paulo Freire, *Pedagogy of the Oppressed* (Continuum, 1971), and *Education for Critical Consciousness* (Seabury Press, 1973).

171 Richard Kahn and Douglas Kellner, "Paulo Freire and Ivan Illich: Technology, Politics and the Reconstruction of Education," *Policy Futures in Education* 5, no. 4 (December 2007): 431–48.

172 Wisnioski, *Engineers for Change*.

173 See Jacques Ellul, *The Technological Society* (Knopf, 1964); Lewis Mumford, *Technics and Human Development: Myth of the Machine*, vol. 1, 2 vols. (Harcourt Brace Jovanovich, 1967).

174 Allen Schmieder, "Robots Universal Robots," in *Using Computers to Enhance Teaching And Improve Teacher Centers* (National Teachers Centers Computer Technology Conference, Houston, 1981), 7–11.; Allen Schmieder,

Counterculture criticism were more nuanced, albeit negative. An initial 1967 government report on attitudes towards CAI warned: “For many students and teachers, the computer and the IBM card are symbols of an automated society which is dangerously depersonalized.”[175] In 1972, Suppes and Morningstar identified teachers’ four main concerns about automation: three of them, standardization, depersonalization, and loss of human freedom, were also associated with the Counterculture movement (the fourth concern was the over-simplification of educational material).[176] By 1975, these concerns appeared in another study on CAI as “Fears about CAI.”[177] In the same year, a literature review on students’ attitudes towards CAI for the Air Force Human Resources Lab questioned whether the evidence collected so far by CAI research showed students had feelings of “depersonalization” and “dehumanization” (the answer was: no).[178]

The significance of the Black Box Entanglement in naming emotional practices performed by CAP research is most evident in the first influential definition of “Computerphobia” by Timothy Jay in 1981.[179] According to Jay, Computerphobia implies “(1) resistance to talking about computers or even thinking about computers, (2) fear or anxiety toward computers, and (3) hostile or aggressive thoughts about computers.”[180] To clarify the meaning of “hostile or aggressive thoughts about computers,” he used the slogan “let’s bend, fold, and mutilate these cards!”[181] as a direct reference to the 1960s punched card protests. This reference openly points at the Technopolitical Resonance established between CAP researchers and the military-industrial complex, opposing the Counterculture. From the 1980s, there was no more explicit mention of Counterculture practices in CAP research, however Jay’s definition of computerphobia was,[182] and still is,[183] widely influential. Whereas later definitions of “computerphobia” then “computer anxiety” lost their direct connection

“[Untitled],” in *Look to the Center* (National Teachers Centers Directors Conference, Washington, 1982), 61–64.

175 Robert H. Davis, Frank N. Marzocco, and M. Ray Denny, “Interaction of Individual Differences with Methods of Presenting Programed Instructional Materials by Teaching Machine and Computer” (Learning Service and Human Learning Research Institute, Michigan State University, 1967), https://eric.ed.gov/?id=ED017190.

176 Patrick Suppes and Mona Morningstar, *Computer-Assisted Instruction at Stanford, 1966-68: Data, Models, and Evaluation of Arithmetic Programs* (Academic Press, 1972).

177 Donna Rothenberg and Robert P. Morgan, *“Case Studies of Innovation in the Educational Service Sector”* (Center for Development Technology, Washington University, 1975), https://eric.ed.gov/?id=ED112941.

178 Anne Truscott King, *“Impact of Computer-Based Instruction on Attitudes of Students and Instructors: A Review”* (Air Force Human Resources Lab, 1975).

179 Timothy B. Jay, “Computerphobia: What to Do about It,” *Educational Technology* 21, no. 1 (1981): 47.

180 Jay, 47.

181 Ginevra Sanvitale, “Fear of Falling Behind and the Medicalization of Computer Attitudes in Cold War USA (1960s–1980s),” Technikgeschichte 86, no. 3 (2019): 227–44; Jay, “Computerphobia: What to Do about It.”

182 Larry D. Rosen, Deborah C. Sears, and Michelle M. Weil, “Computerphobia,” *Behavior Research Methods, Instruments & Computers*, 167–79; Bauer, “Technophobia.”

183 Odai Y. Khasawneh, “Technophobia: Examining Its Hidden Factors and Defining It,” *Technology in Society* 54, no. 1 (2018): 93–100; Katharina F. Pfaffinger et al., “Digitalisation Anxiety: Development and Validation of a New Scale,” *Discover Mental Health* 1, no. 1 (November 29, 2021): 3.

with Counterculture critique, this connection remained visible in the tools for measuring computerphobia and anxiety.

1.3 From Computerphobia to Counterculture. Regulating macro-political discontents

After "naming" this new emotion, researchers seemingly still had to discover what it actually was. In the Behavioral Sciences, definitions of "computerphobia" and "computer anxiety" produced after Jay's, were elusive. CAP researchers agreed that in the majority of their subjects, computer anxiety and computerphobia did not fulfill the criteria to qualify as anxiety disorders in the Diagnostic and Statistical Manual of Mental Disorders (DSM).[184] Many authors did not even specify what they meant with the terms "anxiety" or "fear." They characterized computer anxiety and computerphobia as part of a range of negative feelings emerging during the interaction with or when thinking about computers. Formal definitions were recursive: "computer anxiety" was often defined as "fear of computers" and vice versa. Other descriptions were: "[Computer anxiety is] the fear or apprehension felt by individuals when they used computers, or when they consider the possibility of computer utilization,"[185] or "A computerphobic may evidence: (a) anxiety about present or future interactions with computers or computer-related technology."[186]

To better understand what it meant to be a "computerphobic," we have to further analyze the operationalization of this definition in a specific research methodology. More than by a formal definition, computerphobic subjects could be identified by their undesirable emotional attitude towards computers. The division between positive and negative attitudes constituted the basis for a "regulating emotional practice," because it classified and sanctioned what was the right and wrong way to "feel" about computers.

The regulating emotional practice in CAP research shows again the Technopolitical Resonance existing between the researchers and the military-industrial complex, based on the Black Box Entanglement. The regulation was established by the surveys measuring computer attitudes. The surveys presented a list of statements on computers. Survey respondents had to state their level of

184 The American Psychiatric Association's manual for the classification and diagnosis of mental disorders. Scott T. Meier, "Computer Aversion," *Computers in Human Behavior* 1, no. 2 (1985): 171–79; Heinssen, Glass, and Knight, "Assessing Computer Anxiety."

185 Maurer and Simonson, "Development and Validation of a Measure of Computer Anxiety."

186 Full definition: "[…] (b) negative global attitudes about computers, their operation or their societal impact; or (c) specific negative cognitions or self-critical internal dialogues during present computer interaction or when contemplating future computer interaction" Rosen, L.D., & Weil, M.M. (1989) Computers, classroom instruction and the computerphobic university student. (Manuscript submitted for publication) 6. Quoted in: Rosen and Maguire, "Myths and Realities of Computerphobia."

agreement with each of the statements. The researcher would then analyze the data to assess how computerphobic or computer anxious the sample was. Whereas the Counterculture was no longer mentioned in formal definitions, its concerns and ideas were often employed as indicators of a fearful/anxious, and therefore pathological, attitude.

CAP survey statements usually came under three main categories: behavior, feelings and emotions, and beliefs.[187] Many surveys presented a combination of the three, others only analyzed one. Statements on behavior asked how users actually acted around computers, for example "I avoid using computers whenever I can."[188] Statements on feelings and emotions asked what subjects felt when interacting, or thinking about the interaction with computers, for example "I look forward to using a computer in my work."[189] Statements about beliefs focused on the real or projected social consequences of computers, for example: "The overuse of computers may be harmful and damaging to humans" or "Life will be easier and faster with computers."[190] The two final categories, "computer feelings" and "computer beliefs," are particularly fruitful to show how the regulating emotional practice performed by CAP research amplified the Technopolitical Resonance of the Black Box Entanglement.

The most quoted "pioneer" study in CAP research was a work by Robert Lee, an IBM social psychologist who had worked in its educational technologies division. The statements on "computer beliefs" in CAP surveys were consistent over time, heavily informed by his work. The study ran in 1963, but the results were not published until 1970 under the title "Social Attitudes and the Computer Revolution." Lee's work is remarkable for three reasons: first, it was not aimed at students or teachers but the general public; second, it did not measure computer attitudes after direct exposure to computers, but was a "pure" opinion study; third, it delineated a classification between "positive" and "negative" attitudes. The survey presented 20 statements about computers, collected from interviews and computer cartoons published in popular magazines. The survey sample of 3,000 people indicated their level of agreement with each statement. Lee identified two groups of statements with a significant correlation, defined as the "Beneficial Tool for Mankind Perspective"

187 According to Triandis's three key definitions of attitudes: cognitive, behavioral, and affective. See: Mary J. Reece and Robert K. Gable, "The Development and Validation of a Measure of General Attitudes Toward Computers," *Educational and Psychological Measurement* 42 (1982): 913–16.

188 Matthew M. Maurer, "Development and Validation of a Measure of Computer Anxiety" (Master thesis dissertation, Iowa State University, 1983).

189 Heinssen, Glass, and Knight, "Assessing Computer Anxiety."

190 Nickell and Pinto, "The Computer Attitude Scale."

and the "Awesome Thinking Machine Perspective." The former focused on the positive implications of computing, while the latter included many negative statements.

In Lee's work, these two perspectives were not marked as "positive" or "negative." Lee explicitly stated his aversion to such a dichotomous classification, pointing out how "At first glance, it is tempting to label these factors as 'positive' and 'negative' and let it go at that. A closer examination, however, shows that this is a totally inadequate formulation and would not do justice to the data."[191] However, later CAP studies, which often drew from Lee's work to assemble statements for the surveys, consistently applied this classification.

Criticism of the "technocratic" use of technology often featured as indicator of a "negative" computer attitude in statements about computers beliefs. A very popular indicator for negative computer attitudes, both in CAI and CAP research, concerned "depersonalization" and "dehumanization." Lee did not explicitly use these terms, but conveyed similar concepts. For example, one of the "Awesome Thinking Machine" statements in his survey reads: "With these machines, the individual person will not count for very much anymore."[192] Later surveys explicitly mentioned dehumanization and depersonalization, with statements such as: "I am not in favor of computer-based instruction because it is another step in the depersonalization of education;"[193] "Computerization tends to dehumanize people;"[194] "Computer simulated experiments tend to dehumanize the science laboratory;"[195] "Computers dehumanize society by treating everyone as a number;"[196] "Computers are beginning to make us less human;"[197] "Computers are dehumanizing to society."[198]

191 Robert S. Lee, "Social Attitudes and the Computer Revolution," *Public Opinions Quarterly* 34 (1970): 53–59.
192 Lee, 55.
193 Francisco N. Arumi, "An Experiment in the Use of Computer-Based Education to Teach Energy Considerations in Architectural Design," *Journal of Architectural Research* 4, no. 1 (1975): 44–46; Long and Riedesel, *Use of Computer Assisted Instruction for Mathematics In-Service Education of Elementary School Teachers. Final Report*.
194 P. J. Nicholson, W. R. Franta, and R. E. Anderson, "The Impact of a Computers and Society Course on Student Perspectives," in Proceedings ACM Annual Conference (New York: Association for Computing Machinery, 1973), 81–86.
195 William Rodney Hughes, "A Study of the Use of Computer Simulated Experiments in the Physics Classroom" (Doctoral Dissertation, Ohio State University, 1973).
196 Philip A. Griswold, "Some Determinants of Computer Awareness among Education Majors," AEDS Journal 16, no. 2 (January, 1983): 92–103; Annalyse Callahan Raub, "Correlates of Computer Anxiety in College Students" (Doctoral Dissertation, University of Pennsylvania, 1981).
197 Morton Wagman, "A Factor Analytic Study of the Psychological Implications of the Computer for the Individual and Society," *Behavior Research Methods & Instrumentation* 15, no. 4 (July 1983): 413–19.
198 Nickell and Pinto, "The Computer Attitude Scale."

Another popular "negative" statement linked to Counterculture criticism concerned control issues. A statement in Lee's "Awesome thinking machine" cluster claims "Someday in the future, these machines may be running our lives for us."[199] Some later examples are: "In the future, power will be concentrated in the hands of the technology elite;" and "Computers have the potential to control our lives;"[200] "A person today cannot escape the influence of computers;"[201] "I feel computers control people;"[202] "Soon our world will be completely run by computers;"[203] "People are becoming slaves to computers.[204]

Conversely, belief statements denoting positive computer attitudes were based on the positive changes that computers could make. Positive statements mostly praised the overall benefits of computing. One of Lee's "Beneficial Tool of Man Perspective" statements argues "[Computers] will help bring about a better way of life for the average man."[205] Later, CAP authors suggested "Computers are beneficial aids to modem society,"[206] "Computers can be used to save lives,"[207] "The use of computers is enhancing our standard of living,"[208] "Computers are bringing us into a bright new era."[209]

A large subset of these positive statements on computer beliefs is related to work, organizational efficiency, and time management. Two statements from Lee's study exemplify this subset: "[computers] are becoming necessary for the efficient operation of large business companies," and "These machines will free men to do more interesting and imaginative types of work."[210] Later examples are: "Computers will improve education;"[211] "The potential for computer use in mental health is tremendous;"[212] "Computers would motivate my students to do better work;"[213] "In medical

199 Lee, "Social Attitudes and the Computer Revolution." p. 55
200 Raub, "Correlates of Computer Anxiety in College Students."
201 Griswold, "Some Determinants of Computer Awareness among Education Majors."
202 Ruth Elkins, "Attitudes of Special Education Personnel toward Computers," *Educational Technology* 25, no. 7 (1985): 31–34.
203 Nickell and Pinto, "The Computer Attitude Scale."
204 Nickell and Pinto.
205 Lee, "Social Attitudes and the Computer Revolution." 55
206 Raub, "Correlates of Computer Anxiety in College Students."
207 Reece and Gable, "The Development and Validation of a Measure of General Attitudes."
208 Nickell and Pinto, "The Computer Attitude Scale."
209 Nickell and Pinto.
210 Lee, "Social Attitudes and the Computer Revolution," 55.
211 Griswold, "Some Determinants of Computer Awareness among Education Majors."
212 Scott T. Meier, "Predicting Individual Differences in Performance on Computer-Administered Tests and Tasks: Development of the Computer Aversion Scale," *Computers in Human Behavior* 4, no. 3 (January 1988): 175–87.
213 Robin H. Kay, "A Practical and Theoretical Approach to Assessing Computer Attitudes: The Computer Attitude Measure (CAM)," *Journal of Research on Computing in Education* 21, no. 4 (June 1989): 456–63.

diagnosis, I believe that computers are faster and more accurate than a doctor;"[214] "If I had to use a computer for some reason, it would probably save me some time and work."[215]

Regarding feelings and emotions, the statements denoting a "negative" computer attitude were generically linked to feelings such as fear, anxiety, and insecurity: "I sometimes feel intimidated when I have to use a computer,"[216] and "Computer technology sounds like confusing jargon to me."[217] But they could also express an overall lack of interest in the technology: "Learning about computers is boring for me."[218] "I do not enjoy talking with others about computers."[219] "The challenge of solving problems with computers does not appeal to me."[220] On the other hand, statements denoting a positive computer attitude were linked to feelings of joy, confidence, and enthusiasm, for example: "Computers make my life enjoyable."[221] "I will be able to keep up with the important technological advances of computers."[222] "I look forward to a time when computers are more widely used."[223]

It might seem obvious that statements with a positive connotation indicated a positive computer attitude, unlike negative statements. However, the underlying assumption in CAP research was that a positive computer attitude was also the most appropriate and desirable, while a negative attitude was inappropriate and undesirable. The application of this kind of categorization is, however, far from obvious. For example, if we read CAP survey statements with a different technology in mind, the perception of what is appropriate might be very different. With a much more narrowly used technology like a hammer, a sentence such as "I will be able to keep up with important technological advances in hammers," only seems appropriate for a small category of specialized workers. Or, with a technology related to important ethical issues, the perception might be completely reversed: it seems appropriate that a person would say "I sometimes feel intimidated when I have to use a chemical weapon," whereas it would be disturbing if someone said "I look forward to a time when chemical weapons are more widely used."

214 Wagman, "A Factor Analytic Study of the Psychological Implications of the Computer for the Individual and Society."
215 Maurer, "Development and Validation of a Measure of Computer Anxiety."
216 Maurer.
217 Raub, "Correlates of Computer Anxiety in College Students."
218 Reece and Gable, "The Development and Validation of a Measure of General Attitudes."
219 Brenda H. Loyd and Clarice Gressard, "Reliability and Factorial Validity of Computer Attitude Scales," *Educational and Psychological Measurement* 44, no. 2 (1984): 501–5.
220 Loyd and Gressard.
221 Reece and Gable, "The Development and Validation of a Measure of General Attitudes."
222 Raub, "Correlates of Computer Anxiety in College Students."
223 Maurer, "Development and Validation of a Measure of Computer Anxiety."

The process of categorizing negative statements on computers as inappropriate, and positive ones as appropriate, was therefore a regulating emotional practice which amplified the Technopolitical Resonance of the Black Box Entanglement. Consequently, a division emerged between appropriate/inappropriate, healthy/unhealthy, and desirable/undesirable computer attitudes. CAP research scientifically validated the idea that those who did not embrace computers with enthusiasm would be left behind: not only by becoming professionally and economically marginalized, but also socially marginalized as people with psychological malfunctions. Inevitably, this also implies being politically marginalized: if political dissent is considered a symptom of a medical condition, that dissent no longer has any credibility in public debates.

The genesis of CAP research, therefore, points at how the Black Box Entanglement fostered a de-politicization of computer debates. It started with the mobilization of Fear of Falling Behind the Closed World, followed by naming Counterculture's criticism as "computerphobia", and ended with regulating enthusiasm about computers as a "desirable" attitude, and computerphobia as an "undesirable" attitude. The process I have described so far is mostly related to the macro-political level. However, we can trace an analogous path for how CAP research addressed the micro-politics of computing.

1.4 From Counterculture to hackers. Regulating micro-political discontents

CAP research did not question the micro-politics of computer design, because their design was not considered a possible cause of people's computer anxiety and phobia. CAP research seldom featured in computer sciences or engineering academic journals, showing that its findings were not meant to foster a change in computer design.[224] All the responsibility for improving computer attitudes fell on the individual user. In this way, CAP research implicitly supported the idea that the computer's black-boxed design was not related to computerphobia or anxiety.

The most common "cures" for computerphobia were computer experience and psychological counseling. However, gaining "computer experience" did not necessarily imply understanding how computers actually worked: it usually meant the ability to use computer programs. For example, in the US department of Education's Computerphobia Reduction Program, the most practical computer interaction consisted of using the program "Print Shop" to print a course completion certificate. A set of instructions detailed what to type in the computer and which keys to press.

224 Bauer, *"Technophobia"*

Program participants did not learn about computers, nor how "Print Shop" worked: they merely followed the guidelines to make it work.[225]

CAP research support for black-boxed computers became explicit from the late 1970s, when a new research sub-theme emerged: computer addiction. Literature on computer addiction was not as popular as on computerphobia, but followed a similar pattern. The notion of computer addiction was informed by mobilizing and regulating emotional practices which mirrored those used to define computerphobia and computer anxiety. But, instead of Counterculture activists, "hackers" became the model for the new definition.

From the 1970s, the word "hacker" became a self-attributed label, identifying computer experts deeply passionate about computers. In his well-known book *Hackers: heroes of the computer revolution*, Steven Levy identified a particular "hacker ethic," which originated in the 1950s-60s MIT computer lab and exhibited a series of exhortations and statements on computers.[226] Two of these statements resembled those in the CAP surveys: "You can create art and beauty on a computer" and "computers can change your life for the better." However, the hacker ethic's initial statements had a stronger Technopolitical Resonance with the Counterculture than with the Closed World. First and foremost, hackers believed that "All information should be free," and that they should "mistrust authority" and "promote decentralization." According to Levy, "What really drove the hackers crazy was the attitude of the IBM priests and sub-priests, who seemed to think that IBM had the only 'real' computers, and the rest were all trash. You couldn't talk to those people, they were beyond convincing. They were batch-processed people, and it showed not only in their preference of machines, but in their idea about the way a computation center, and a world, should be run."[227] More than anything, then, hackers sought to freely explore the potential of computers outside any corporate or otherwise top-down constraint.

The history of hacking is also associated with emerging mid-1970s debates on software copyright. The software market was growing at the time, and its legal status became increasingly contested. Debates on software copyright were animated by two competing emotional practices. The first mobilized the fear of falling behind the Closed World, employed to promote closed source software —that is to say, it amplified the Black Box Entanglement's Technopolitical Resonance. The second

225 See: Weil, "Computerphobia Reduction Program."
226 Steven Levy, *Hackers: Heroes of the Computer Revolution* (Anchor Press/Doubleday, 1984).
227 Levy, 34.

mobilized the Fear of Falling Inside the Closed World, to promote open-source software and counter the Black Box Entanglement.

A well-known example of mobilizing Fear of Falling Behind against hackers is by Microsoft founder Bill Gates, who published his famous “Letter to hobbyists” in 1976. Gates was concerned that the hobbyist's practice of considering any piece of software freely available to reuse would harm the development of a software industry: “One thing you do do, is prevent good software from being written. Who can afford to do professional work for nothing?” he asked.[228] The letter received a mixed response. Those with a business mindset praised it. Others pointed at the flaws in his argument and at the success Gates’s product had achieved precisely because it was copied and shared by many. Gates certainly had a point: his fellow hobbyists kept on freely exchanging his Altair BASIC instead of buying it, therefore hindering his business plans. But his letter also amplified the Technopolitical Resonance of the Black Box Entanglement, placing Gates in continuity with the US military-industrial complex and with CAP researchers: the underlying assumption was that the development of good quality software was inevitably linked to the dynamics and structure of the US capitalist economy. Gates’s argument could have sounded different: he might have encouraged a collective reflection on allowing programmers to make a living while letting users see and improve source codes. Instead, he advocated framing software in traditional market terms.

On the other hand, MIT computer scientist Richard Stallman, defined by Levy as “the last true hacker,” became one of the most committed critics of the Black Box Entanglement. Shortly after the 1981 Computer Software Copyright Act, he introduced the notion of the “EMACS Commune” to identify all the users and developers of EMACS, a popular text editor he designed. Stallman stated that EMACS was free to use and modify, on condition that each new feature should also be sent to him and other users.[229] In the following years, Stallman set up the “GNU” project to develop a Free Software operating system for computer users. Between 1984 and 1985, he founded the Free Software Foundation, a legal entity primarily aimed at channeling funding for the project, and published the *GNU Manifesto* detailing the scope and working of his project.[230] One of the most famous claims by Stallman was that his situation resembled that of Ishi, thought to be the last

228 Bill Gates, “Open Letter to Hobbyists,” *Homebrew Computer Club Newsletter*, February 1976. 2.
229 Christopher Kelty, “Inventing Copyleft,” in *Making and Unmaking Intellectual Property* (University of Chicago Press, 2015), 133–48.
230 Richard Stallman, “The GNU Manifesto,” 1985, https://www.gnu.org/gnu/manifesto.html.

known member of the Yahi people, Native Americans from California.[231] By comparing himself to "the last Yahi," Stallman mobilized the Fear of Falling Inside; his people would be assimilated by the computer industry, and the old software culture based on the free exchange of code would disappear.

The conflict between these two mobilizing emotional practices was also translated into CAP research, which took the side of the "closed software in the Closed World" perspective. In fact, CAP researcher regulated hacker's emotional experiences as denoting an undesirable computer attitude, further confirming the Technopolitical Resonance between them and the Closed World military-industrial complex, based on the Black Box Entanglement. Hacking was not as explicitly political as the Counterculture, yet nonetheless it defied the Closed World vision as it promoted a non-productive use of computers and an anti-authoritarian mindset.

Before Levy's book, which depicted hacking as positive, publications about hackers were much less flattering, suggesting that hacking could have a pathological component. One of the first popular depictions of hackers as pathological subjects was by MIT computer scientist Joseph Weizenbaum in 1976. In his book *Computer Power and Human Reason,* he warned against the potential dangers of pathological computer dependency in certain hackers, leading to their dehumanization.[232] This is one of the first notable examples of a regulating emotional practice which categorized hacker's emotions about computers as undesirable, although it cannot be said that this practice amplified the Technopolitical Resonance of the Black Box Entanglement . Weizenbaum was a long-time critic of technology misuse, and his macro-political perspective resonated more with the Counterculture than the Closed World.

Another key step in the pathologization of hackers, this time more closely connected to the Black Box Entanglement, happened some years later. In August 1980, the magazine *Psychology Today* published a report "The Hacker Papers."[233] It consisted of testimonies by hackers self-reflecting on the pathological tendencies of their computer use. The papers were collected and commented on by psychologist Philip G. Zimbardo, who 10 years earlier had led the controversial Stanford Prison

231 Reported in: Levy, Steven. *Hackers: Heroes of the Computer Revolution.* (O'Reilly, 2010). This was a hugely inappropriate and culturally insensitive claim, not the first nor the last of this kind by Stallman. Comparing the extermination of a native population by Western colonizers to the tribulations of a group of computer scientists was a powerful metaphor but also a huge overstatement.

232 Joseph Weizenbaum, *Computer Power and Human Reason: From Judgment to Calculation* (W. H. Freeman & Co, 1976).

233 Philip G. Zimbardo, "The Hacker Papers," *Psychology Today*, 1980.

Experiment. Hackers were described as being afflicted by a form of "computer addiction," damaging their personal and social life, and needing expert mental health care. Two years later, Steven Levy wrote a commentary on this report, observing that it produced mixed reactions among the Stanford hacking community. If some people were led to reflect on their habits as hackers, others were reluctant to accept their characterization as pathological subjects. Ironically, some hackers replied to this criticism by defining it as a symptom of "computerphobia."[234]

In the 1980s, CAP authors built on Zimbardo's article and explicitly mentioned hackers as examples of a new syndrome called "computer addiction," thereby performing a naming emotional practice, and highlighted this syndrome as another undesirable computer attitude, performing a regulating emotional practice. For example, in 1984, Toris discussed the emerging "computerphobia (or anxiety)" and "computer addiction (or hacking)" problems,[235] suggesting they were both forms of social anxiety. Other authors did not mention hacking directly, but the description they gave of "computer addicts" matched that of the typical hacker. For instance, in 1983 Starker listed as early indicators of computer addiction the tendency to indulge too often in behaviors like buying computer magazines, visiting computer stores, engaging in discussions about computers.[236] But arguably any hobby or personal interest looks pathological from this perspective. In 1985 Davidson and Walley warned against the concrete risks posed by tinkering too much with computers. As an example of computer addiction, they told the story of a man who quit his job in a computer laboratory to develop his own personal computer prototype. However, after some initial success, the man failed to acquire all the necessary funding, and after a series of misadventures, he ended up being poor and an alcoholic.[237] Even though hacking was not mentioned in this story, it can be read as a cautionary tale.

Creating a medicalized discourse around hacking once again fostered a de-politicization of computer debates, in this case involving the micro-politics of computing. This process mirrored the one involving Counterculture's criticism about the macro-politics of the Black Box Entanglement. If hackers were pathological subjects, "addicted" to computers like a drug user addicted to heroin, their request that everyone had unfettered access to the new machines had no political standing.

234 Steven Levy, "Hackers in Paradise," *Rolling Stone*, April 15, 1982.
235 Carol Toris, "Suggested Approach to the Measurement of Computer Anxiety" (Annual Meeting of the Southeastern Psychological Association, New Orleans, 1984).
236 Steven Starker, "Microcomputer Mania: A New Mental Disorder," *Hospital & Community Psychiatry* 34, no. 6 (1983): 556.
237 Robert S. Davidson and Page B. Walley, "Computer Fear and Addiction: Analysis, Prevention and Possible Modification", *Journal of Organizational Behavior Management* 6, no. 3–4 (1985): 37–52.

Rather, hackers' attitudes to computers had to be fixed in order to make them functioning members of society, otherwise they would fall behind.

Although the notion of "computer addiction" never gained the same importance as "computerphobia" and "computer anxiety," it was an important factor in de-politicizing the micro-politics of computing. In the 1980s, "computer addiction" became widespread enough in US society for it to be used by lawyers defending hacker Kevin Mitnick, on trial for computer related crimes in 1989.[238] The Mitnick trial is interesting because it also points at a shift in the processes involved in the de-politicization of hacking. Not only the medicalization enforced by CAP research, but also a criminalization process was involved in the public representation of hackers.[239] The Mitnick case indeed involved a crime, but the fact that one hacker committed a crime should not imply that all hackers did so. Although Mitnick was not the only hacker involved in criminal proceedings, the numbers still do not sustain the argument "all hackers are criminals." However, this is still the prevalent negative depiction of hackers in today's public discourses.

While the criminalizing narrative on hackers gained momentum, their medicalization was increasingly challenged. From the second half of the 1980s, researchers presented a different version of hackers' emotional attitudes towards computers. In her 1984 book on the social and psychological aspects of computing, *The Second Self: Computers and the Human Spirit,* Sherry Turkle argued that the widespread notion of "hackers" as "computer addicted" was problematic. In her opinion, "the metaphor of addiction evokes an image of a deadened mind, which does no justice to the hackers' experience of their work as alive and exciting."[240] In the late 1980s, Margaret Shotton investigated the link between "hackers" and "computer addiction." She observed how "Early readings about 'computer junkies' and 'hackers' suggested that if I pursued this research, I might spend my time with people who were barely human and who were unable to converse with others on any meaningful level."[241] She discovered this was an exaggerated picture, as people self-describing as "hackers" did not have pathological traits and were interesting yet regular people.

238 Reed, "Governing (through) the Internet."

239 For an example of this criminalization at the European level, see: Kai Denker, "Heroes yet Criminals of the German Computer Revolution," in *Hacking Europe* (Springer, 2014), 167–87.

240 Sherry Turkle, *The Second Self: Computers and the Human Spirit*, 20th anniversary ed., 1st MIT Press ed (MIT Press, 2005), 191.

241 Margaret A. Shotton, *Computer Addiction? A Study of Computer Dependency* (London, New York, Philadelphia: Taylor & Francis, 1989). xi.

Notwithstanding the medicalization and criminalization of hacking, Richard Stallman's GNU project attracted more and more interest. The Free Software Movement set an important milestone with the development of a dedicated licensing framework: the GNU GPL license (GNU General Public License). The first version of the license was issued in 1989, to provide a legal framework suitable for the principles of Free Software.[242] Over the years, the license was updated and modified, but always adhered to the four original conditions defining a program as Free Software: freedom to use, freedom to study, freedom to share, freedom to improve. In the early 1990s, the programmers working on GNU had developed almost all the components required to run it except for the kernel, the operating system's central core. In this period, Finnish student Linus Torvalds came into play with his kernel, which he called Linux. In 1992, Torvalds decided to release his code under a GPL license, thus enabling its integration in GNU. The GNU/Linux operating system was the most successful large scale experiment challenging the Black Box Entanglement. It forms the basis for the many Free Software distributions existing today, and the GPL license is widely used in software projects.

These successes did not mark the end of the Black Box Entanglement , as exemplified by the "Microsoft vs Free and Open Source Software" example which I discuss in my conclusion. Nonetheless, they are important because they show that, although the Black Box Entanglement was pervasive and influential, other sources of Technopolitical Resonance kept on sounding. The de-politicization fostered by the Black Box Entanglement certainly had a significant impact on computaer debates. But, to some historical actors, political discourses on computing remained very relevant.

1.5 Conclusion: the Black Box Entanglement and its Discontents

In Cold War US, the Black Box Entanglement set forth Technopolitical Resonance between the Closed World military-industrial complex and the behavioral scientists researching on "computer attitudes," "computerphobia" and "computer anxiety." This process evolved through a series of interconnected emotional practices fostering the medicalization of the "computer attitudes" that did not match the Closed World aims of establishing a global, technologically advanced, capitalist society. These "computer attitudes" were notably associated with the Counterculture and the hackers. The result was a de-politicization of computer debates: describing the Counterculture and

242 GNU Project - Free Software Foundation, "GNU General Public License v1.0," 1989, https://www.gnu.org/licenses/old-licenses/gpl-1.0.html, accessed September 20, 2022.

hackers' discourses and practices as if denoting pathological computer attitudes meant disqualifying them from the public arena.

Looking at the various phases of medicalizing computer attitudes in CAP research shows how this depoliticization occurred and highlights how different Closed World ambitions informed the process over time. The first phase coincided with the mobilization of Fear of Falling Behind in educational technologies. Research on people's attitudes towards Computer Assisted Instruction (CAI) was mostly connected with the first goal Edwards identified, "enclosing the Soviet Union." The military-industrial complex's fear of falling behind the Soviet Union was projected in the education sector: improving teachers' and students' attitudes to computers was first and foremost a matter of national security as they also had to play their part in building the technological superiority needed to win the Cold War race. At this point, public debates on computers were still political: mobilizing the Fear of Falling Behind did not always establish Technopolitical Resonance with the Closed World military-industrial complex. It actually generated a counter-mobilization of fear, the Counterculture's Fear of Falling Inside. The conflict between the Closed World and the Counterculture was mostly at the macro-political level, as the micro-politics of computer design were controlled by the military-industrial complex and therefore extremely black-boxed.

Moving from CAI research to CAP marked a shift in the kind of Cold War ambitions pursued. The second Closed World ambition, "enclosing the capitalist nations," prevailed as the US/USSR dichotomy was slowly replaced by the neoliberal "no alternative." The mobilization of Fear of Falling Behind was accompanied by two further emotional practices: "naming" Counterculture's criticism "computerphobia" and "regulating" computerphobia as an undesirable attitude. These two practices further amplified the Technopolitical Resonance of the Black Box Entanglement and the de-politicization of computer debates. The focus was no longer on Computer Assisted Instructions, but computers in general. The definition of the Counterculture's criticism as "fearful" was institutionalized, and linked to a psychological malfunction rather than an alternative political vision.

The notion "computerphobia" was soon joined by its counterpart "computer addiction," closely related to the micro-politics of computer design. This was the final phase in the medicalization process instigated by CAP: regulating overly positive attitudes as being equally undesirable as overly negative ones. Two competing fears emerged: on the one hand, the computer industry's Fear of Falling Behind, which established Technopolitical Resonance with the Cold War military-

industrial complex; and on the other hand, the hackers' Fear of Falling Inside, which established Technopolitical Resonance with the Counterculture. Both mobilizing practices had the potential to foster a re-politicization of computer debates, but the pathologization of hackers as "computer addicts" and then their criminalization, hindered the process.

The genesis of CAP research, and the way it amplified the Technopolitical Resonance of the Black Box Entanglement, were closely informed by specific elements of the US context. When geographical sites change, the clash between military-industrial complex goals and Counterculture's concerns might have different outcomes, and provide different historical configurations. The Italian context is an example of this shifting configuration, as I now introduce.

Chapter Two

Before the Black Box Entanglement: Resonant technopolitical feeling-thoughts in Cold War Italy

We were all ready to die
but we never spoke of death:
we talked about the future.
If destiny will tear us apart
the memory of those days
will keep us united forever

"And I was Sandokan," Armando Trovajoli, 1974[243]

"I've never seen anyone wear that gray-green outfit with a pistol at the waist more awkwardly and less martially than him. He had a pronounced melancholic air about him, which was perhaps because he didn't like being a soldier in the least. He was shy and quiet, but when he did speak, he talked for a long time in a low voice and said confusing and enigmatic things while staring off into space with his small blue eyes, at once cold and dreamy."[244] This was sometime between August 1923 and June 1924.[245] The man was Adriano Olivetti in his early 20s, a cadet on leave from military training. The author was Natalia Ginzburg, née Levi, whose family history was interwoven with the Olivetti family.[246] When, years later, Adriano became an accomplished industrialist and president of the family company, she observed how "he'd maintained something of the tramp about him and he moved in the shuffling, lonely gait of a vagabond as he had in his youth when he was a soldier."[247] He was still shy, Ginzburg noted, but tried hard to hide this when he met people, and "would throw back his shoulders and stand tall, his eyes lit by a frozen glare, cold and pure."[248]

243 "Eravam tutti pronti a morire // ma della morte noi mai parlavam // parlavamo del futuro // se il destino ci allontana // il ricordo di quei giorni // sempre uniti ci terrà." This song is the soundtrack to the movie "We All Loved Each Other So Much" (C'eravamo tanto amati), by Ettore Scola. It tells of three friends returning to regular life, having fought together in the WWII Resistance. Their paths would diverge, also politically, but a strong bond united them. The song is about the hopes and memories of Partisan fighters, and became a popular "posthumous" Resistance song. I call it "posthumous" because it was written and sung after the end of WWII.

244 Natalia Ginzburg, Family Lexicon (New York Review of Books, 2017), 131. Natalia Ginzburg was a renowned author and translator. This autobiographical family history is one of her well known works. The passage here describes when she first met Adriano Olivetti, a friend of her brother Gino.

245 According to biographies, Olivetti was in the military during this period. See: Valerio Ochetto, *Adriano Olivetti. La biografia* (Edizioni di Comunità, 2013). When Gino Levi and Adriano Olivetti were doing their military service, Benito Mussolini was fascist dictator of Italy, after the infamous March on Rome in October 1922.

246 Gino Levi, Natalia's brother, was a close friend of Adriano Olivetti while they were students at Turin Polytechnic. Adriano later married Paola, another Levi sibling, and Gino became a manager at Olivetti.

247 Ginzburg, *Family Lexicon*, 317.

248 Ginzburg, 317.

After WWII, Adriano Olivetti became a key figure for popularizing computers in Italy. In the 1950s he tried manufacturing computers locally, producing original models which could compete with US and European vendors. In doing so, he stressed the importance of design, beauty, and "humanistic" values in the development of technology. His endeavor, however, was not successful: Adriano died suddenly in 1960, aged 59, and neither his family,[249] the State, nor the rest of the Italian entrepreneurial community showed support for his computer investments. However, his personal and entrepreneurial history significantly shaped Italian computer debates, ultimately making Adriano Olivetti a much more beloved figure after his death than in his lifetime.

The way Ginzburg described Olivetti's gaze exemplifies the standard depiction of the man as a visionary ("dreamy" and "pure") not understood in his lifetime ("cold," distant, even unfathomable, as he spoke of "enigmatic things"). In contrast, Ginzburg also describes Adriano Olivetti's other gaze, a "breathless, terrified, excited expression when he was helping someone to safety."[250] Ginzburg first saw this expression when Adriano helped Filippo Turati, leader of the Italian Socialist Party (Partito Socialista Italiano, PSI), escape from the fascist regime.[251] The Olivetti and Levi families' relationship was not only based on personal ties: they were both involved in socialist politics and anti-fascist resistance.[252] Ginzburg witnessed this mixture of terror and excitement again when Adriano personally took her to a safe refuge after her husband Leone was arrested by the fascist police.

But Adriano Olivetti was not the first Italian to foster connections between socialism and technology. Leading figures on both the communist and anarchist side of the Italian socialist spectrum criticized the capitalist use of technology and "deterministic" and "mechanistic" views on technological development, but also refused to accept technology as a mere product of capitalism. This perspective is found in the writings of Errico Malatesta and Antonio Gramsci, considered the "founding fathers" of Italian anarchism and communism: Malatesta "made anarchists," while Gramsci "made communists."[253] Both criticized the deterministic discourse on science and

249 With the notable exception of his son Roberto, who did not gain enough support from the rest of the Olivetti board. See section 2 on the sale of Olivetti's electronic division.

250 Ginzburg, *Family Lexicon*, 319.

251 Ginzburg, 185.

252 It must be said that their involvement had a different level of commitment, and different consequences. Adriano Olivetti would later tone down his anti-fascist activities, only reprising them in the middle of WWII, when he also fled Italy. The Levi family, on the other hand, continued their involvement in the anti-fascist clandestine group "Justice and Freedom" (Giustizia e Libertà). It cost Natalia's husband Leone his life as he died in a fascist jail in 1944, after being tortured by the Nazis.

253 Carl Levy, "Charisma and Social Movements: Errico Malatesta and Italian Anarchism," *Modern Italy* 3, no. 2 (1998): 213.

technology presented by their international counterparts, Peter Kropotkin and Nikolai Bukharin. But they also encouraged a positive outlook on the political and social significance of science and technology within socialist movements.

To understand Italian post-WWII computer debates, we need to know something about the country's socialist history. Before the fascists came to power in 1922, Italy had a thriving and rich socialist culture. Benito Mussolini was actually a member of the Italian Socialist Party, before being expelled for supporting Italy's participation in World War I. His former comrades soon became his worst enemies. Particularly from 1926, following increased repression of political opposition, the thriving socialist culture of the pre-fascist period was halted, through murder, exile or prison.[254] Italian socialism, however, although weakened and clandestine, survived the regime years. Those who could, stayed in Italy and helped to form organized, armed anti-fascist resistance during WWII. The partisan unit led by the clandestine Italian Communist Party, "Brigata Garibaldi" (Garibaldi Brigade), was the largest group.[255] The name was a tribute to Italian "Risorgimento"[256] hero Giuseppe Garibaldi, powerfully symbolizing that the partisans' struggle went well beyond "resistance" and was also a nation-building process. Many partisan units chose names inspired by the Risorgimento.[257]

These events importantly demonstrate that the Cold War dichotomy was not as strongly oriented towards the capitalist pole in Italy as in the USA, nor was the political debate shaped by US/USSR Cold War polarization. In other words, at a political level, the Fear of Falling Behind which sustained the Black Box Entanglement in the USA was just not as convincing in Italy. Although Italy's material re-construction took place with Marshall Plan resources and under the wing of NATO, socialism had a key role in the nation's democracy-building process.[258] At the 1946 Constitutional Assembly, the combined seats of the Italian Communist Party (PCI) and Socialist Party (PSI) exceeded those of the centrist Christian Democracy (DC): in the post-WWII period, the lively political debate that Mussolini had halted was strongly reinvigorated. Thus the emerging

254 As mentioned earlier, Adriano Olivetti helped Filippo Turati, leader of the Italian Socialist Party, to escape Italy so that he could go into voluntary exile in France. At the same time, the fascist regime imprisoned Communist Party co-founder and Marxist intellectual Antonio Gramsci, who died in jail in 1937 due to poor conditions and lack of proper medical care. Anarchist leader Errico Malatesta decided to remain in Italy and although spared fascist imprisonment, he was put under strict surveillance by the regime and increasingly isolated from political and social circles until his death in 1932, for health and age-related reasons.

255 Paul Ginsborg, *A History of Contemporary Italy - Society and Politics 1943-1988* (Penguin, 1990), 15.

256 The process of Italy's unification in the mid-19th century.

257 For example, "Brigata Mazzini" named by the Italian Republican Party, or "Brigata Osoppo" after an area that strenuously resisted Austrian occupation, finally leading to Italian independence.

258 After WWII, Italy voted to become a republic for the first time.

ideological conflicts were not just between Capitalism and Communism, but also between Christianity and Socialism,[259] and between Fascism and Democracy.[260] The notion of "socialism" was contested, with several groups defining what should have been the aims and the practices of 20th century Italian socialism.[261]

This chapter discusses early historical intersections between technology and so
cialism in Italy, which would be important sources of Technopolitical Resonance in the years to come. I present two resonant sets of feeling-thought. First, Malatesta and Gramsci's feeling-thought on techno-scientific development. Second, feeling-thought centered on Adriano Olivetti's vision and legacy. The feeling-thought *about* Adriano Olivetti and *by* Malatesta and Gramsci were based on a combination of socialism and a positive, yet anti-deterministic, perspective on technological development, which I call "the Principle of Hopeful Curiosity." As I will show, when this feeling-thought was performed through emotional practices, it fostered a re-politicization of computer debates, establishing Technopolitical Resonance between the "old" pre-WWII Italian left, and the "new" post-WWII Italian left.

This chapter, although not prominently featuring the Black Box Entanglement, points out some differences between Italy and the United States that influenced Italians' reaction to Fear of Falling Behind in later years. The aim to establish a technologically advanced capitalist society, and Cold War capitalist/socialist dichotomy, was not as central in Italians' technopolitical feeling-thoughts as in US citizens'. Adriano Olivetti's personal history, and the cultural and political milieu in which he grew up, demonstrate the larger historical processes which weakened the Black Box Entanglement in Italy. A different technopolitical feeling-thought became central in Italian computer debates. I call this "the Principle of Hopeful Curiosity": it stresses the centrality of human agency in the making of both socialism and technology, fostering hope for a human-centered, socialist use of techno-scientific knowledge. The Principle of Hopeful Curiosity would be crucial for the re-politicization of computer debates, opposing the Black Box Entanglement.

259 A key concern for DC leader Alcide De Gasperi was distancing Christian voters from the PCI, whose leader Enrico Berlinguer frequently appealed to. See Ginsborg, *A History of Contemporary Italy*.

260 Neither the symbolic nor the political legacy of fascism was really eradicated after the fall of the regime. Mussolini's grave in Predappio became a public shrine to his memory and is still visited yearly by hundreds of neo-fascists from all across Europe. The Italian Constitution has forbidden the re-founding of the Italian fascist party, yet in 1946, all the fascists who had not been jailed founded the "Movimento Sociale Italiano" (MSI), which never hid its political sympathy. Although the MSI never achieved significant election results, grassroots neo-fascist groups played a considerable role in post-WWII Italian history.

261 These included Social anarchists, Autonomist Marxists, Workerists, labor unionists, revolutionary armed groups, the PSI, the PCI, and other smaller parties.

2.1 “Principle of Hope” meets “Scientific Curiosity.” Emotions and techno-scientific knowledge in Italy’s early socialist movement

Before looking into Italian socialists’ computer debates, it is necessary to understand the role of science and technology in their political vision. Computers are often presented as a “revolutionary” technology, but expectations and discourses about them are typically informed by a larger vision on the societal and political significance of science and technology. For example, the Fear of Falling Behind employed to promote computers in Cold War US also implied a belief in technological determinism. The same belief was also influential in socialism. Marxist Nikolai Bukharin and anarchist Peter Kropotkin famously espoused this view, arguing that science and technology were pointers to the inevitability of socialism (Kropotkin) and tools for its realization (Bukharin). There was Technopolitical Resonance between Bukharin and Kropotkin: they shared a vision on science and technology’ significance for socialism, based on emotions like trust in the revolutionary potential of techno-scientific knowledge and enthusiasm for techno-scientific developments. But this vision is also problematic, because it can foster a de-politicization of science and technology, as observed early on by some Italian socialists.

Errico Malatesta and Antonio Gramsci, key figures in Italian socialist history, did not share the same belief in technological determinism as a fundamental principle for socialism. On the contrary, they harshly criticized this view, urging their comrades to think harder about its political and societal implications. Human agency was a much more fundamental driver of history than techno-scientific development. As discussed in the introduction, Malatesta’s and Gramsci’s political vision was akin to what Bloch called “the Principle of Hope”: they argued for the centrality of human agency in establishing a socialist revolution, opposing deterministic interpretations of anarchism and Marxism. At the same time, they also promoted a positive outlook on techno-scientific knowledge, promoting trust in its emancipatory potential and eagerness to acquire such knowledge (Scientific Curiosity). In other words, there was Technopolitical Resonance between Malatesta and Gramsci, based on the Principle of Hopeful Curiosity.

This section thus looks at how Malatesta and Gramsci performed the Principle of Hopeful Curiosity by mobilizing and regulating emotional practices. They achieved this in their political writings by challenging the determinism of Kropotkin and Bukharin, while also encouraging scientific education and the use of technology among the working class. Some examples will focus on Scientific Curiosity alone, in order to further clarify the concept and its significance in Malatesta’s

and Gramsci's writings. I have already discussed the connection between Malatesta, Gramsci and Bloch's Principle of Hope, thus I will not provide dedicated examples. In post-WWII Italy, the Technopolitical Resonance of the Principle of Hopeful Curiosity was amplified again by a regulating emotional practice, performed through the "canonization" of Malatesta and Gramsci's writings.

2.1.1 "Bread, Freedom, Love, Science": Errico Malatesta's voluntarism

Errico Malatesta, also known as "the socialist Garibaldi" or "the Lenin of Italy,"[262] was a key figure in shaping both Italian and international anarchism. Malatesta also had personal and professional knowledge of science and technology: he studied medicine before dedicating himself full-time to the revolutionary cause, and later worked as an electrician and mechanic to earn a living alongside his political activities. "We want for everyone: bread, freedom, love, science," reads one of his most famous quotes.[263] His political writings reveal regulating and mobilizing emotional practices that fostered a positive attitude towards scientific and technological development while upholding a critical attitude towards its misuses and "mechanistic" perspectives.

Malatesta's emotional practices are pointers to the Principle of Hopeful Curiosity, and also reveal its re-politicizing effect. Malatesta was a prominent and early proponent of this technopolitical feeling-thought within Italian socialism. The Principle of Hopeful Curiosity served two main purposes in his writings: one, to reprimand the comrades who saw technology as a mere tool for workers' exploitation; two, to rebuke Kropotkin's determinism. In the first case, Malatesta re-politicized technology debates by remarking technology's revolutionary potential, while in the second case the re-politicization came from the opposite argument, as he criticized "scientific" theories of anarchism. These two seemingly opposite discourses were actually complementary. The common, and fundamental, issue was the role of human agency in establishing and practicing anarchy. Techno-scientific knowledge could be used either to slow down or to advance the working class' emancipation, but it never operated as an independent force. Claims about science and technology should always be put under close political scrutiny, in order to assess whether they reflected this principle.

262 Levy, *"Charisma and Social Movements."*
263 "Noi vogliamo per tutti: pane, libertá, amore, scienza", Errico Malatesta, "Il Programma Anarchico," 1919, http://www.federazioneanarchica.org/archivio/programma.html, accessed September 20, 2022.

Scientific Curiosity was performed early on by Malatesta. His 1884 booklet *Fra Contadini (*"Between Peasants"), a fictional conversation between farmers Beppe and Giorgio, was a very popular work serving to introduce the principles of anarchy to the working class. Thanks to this pedagogical aim, the booklet also had a normative function. Consequently, the emotional practices that Malatesta performed in the booklet can be seen as regulating emotional practices. The farmers discussed a variety of social and political issues, also touching on technological development: "Ah! machines. They should all be destroyed! They are what is ruining the laborers and taking away work from the poor,"[264] observed Beppe, mobilizing feelings of anger and hatred against technology. But Giorgio, who had the teacher's role in the dialogue, argued in favor: "You're right, Beppe, to believe that machines are one of the causes of poverty and lack of work, but this is because they belong to the masters. If, on the other hand, they belonged to the workers, it would be quite the opposite; they'd become the main source of human well-being. […] So remember, the machines should not be destroyed, but taken over."[265] Through Giorgio's voice, Malatesta was performing a regulating emotional practice, which pointed at Beppe's anger and hatred of technology as understandable, but undesirable, emotions, while raising trust in the emancipatory potential of technology. Scientific Curiosity here implies an invitation to perform one's agency over technology, because acquiring knowledge about technology functioning is a crucial step to adapt it to one's specific needs. In fact, Malatesta often mentioned in the text that machines, given their ability to relieve workers from heavy jobs, could be a fundamental aid for emancipating the working class.

This regulating emotional practice, however, should not be seen as an example of blind enthusiasm towards science and technology. In the 1920 document *Il Programma Anarchico* ("The anarchist program"),[266] Malatesta also performed a regulating emotional practice: this was a fundamental political document, the Malatestian equivalent of Marx's "Communist Party Manifesto." And Malatesta was quite explicit about which emotions were desirable or not from an anarchist standpoint. Having listed the many miseries that afflicted the working classes, he announced, "we want to make amends, replace hatred with love, competition with solidarity, the individual search for personal well-being with brotherly cooperation for the well-being of all, oppression and imposition with liberty, religious and pseudo-scientific lies with truth." This final ambition was particularly crucial, showing that the promise of a better future could not be detached from the quest

264 Errico Malatesta, "Fra Contadini: Dialogo Sull'anarchia," (1884). https://theanarchistlibrary.org/library/errico-malatesta-between-peasants, accessed September 20, 2022.
265 Malatesta.
266 Errico Malatesta, "Il Programma Anarchico," (1920). https://theanarchistlibrary.org/library/errico-malatesta-an-anarchist-programme, accessed September 20, 2022.

for scientific knowledge. Malatesta was again mobilizing Scientific Curiosity, also making an important warning: not everything society calls "science" is actually "scientific" -and anarchists should be committed to correct this misappropriation of "science". Throughout the document, Malatesta highlighted the importance of scientific education, as both a precondition and outcome for anarchist society, while admonishing the mystification of science. The anarchist program's 5th principle summed up his reasoning: "War on religions and all lies, even if they are concealed under the cloak of science. Scientific instruction for all to an advanced level." Malatesta powerfully evoked a war scenario to express the aversion that any anarchist should have towards dogmatism, while encouraging scientific curiosity. His statements were clear: first, even scientific knowledge could foster "lies," therefore it was important to cultivate a critical attitude; second, the way to counteract these lies was to promote widespread scientific education.

The Principle of Hopeful Curiosity notably emerged when Malatesta harshly criticized Kropotkin's definition of anarchy as "a concept of the universe based on a mechanistic interpretation of all natural phenomena, not excluding human society."[267] Malatesta openly challenged this very popular, and very deterministic perspective. In July 1925, the magazine that Malatesta founded, *Pensiero e Volontà* ("Thought and Will"), published a piece on "Science and Anarchy" by Nino Napolitano, exalting Kropotkin's writings. Accompanying the piece was a lengthy rebuttal by Malatesta, who criticized Kropotkin's aforementioned definition as being "neither science, nor anarchy."

To begin with, Malatesta questioned that "mechanistic" (i.e. "deterministic") natural laws could also explain human behavior, observing that physical law suggested an important difference between "matter" and "thought": while the first was subject to the laws of conserving mass, which prevented its infinite reproduction, the second was not. This argument can be read as a practical application of the anarchist program's 5th principle: Malatesta rebuked what he perceived as a mystification of science by opposing a scientific argument. This exemplifies the "scientific curiosity" aspect of the Principle of Hopeful Curiosity.

The "hopeful" component can be observed later in the article, with Malatesta further questioning the very same compatibility of Kropotkin's idea with anarchism. Malatesta fervidly stressed the de-politicizing implications of Kropotkin's argument: "This is pure mechanistic thinking: all that has been, had to be; all that is, must be; and all that will be, will necessarily be, in every minute detail of position, movement, intensity and velocity," Malatesta observed. "In such a vision, what meaning

267 Kropotkin, in Errico Malatesta, "Scienza e Anarchia," *Pensiero e Volontà*, July 1925, 172.

can there be for ‘free will,’ ‘freedom’ and ‘responsibility’? The predestined events in human history cannot be changed, any more than we can change the orbit of the stars ‘or the growth of a flower.’ And then, what has this to do with anarchy?”[268] This argument powerfully shows the centrality of voluntarism in Malatesta’s thought: Anarchy is an act of will, therefore denying the significance of human agency in favor of a deterministic hope is incompatible. Anarchists’ hope should lie in the possibility to achieve self-emancipation through political practice, not in some “natural” law. Malatesta is therefore stressing the centrality of what could be termed, following Bloch, a “warm stream” of anarchism against the “cold stream” privileged by Kropotkin.

This article probably had a normative intention, but I would classify Malatesta’s emotional practice as mobilizing rather than regulating. The debate over science and anarchism continued after this article, showing that whatever Malatesta’s normative intention (if any), it was not immediately successful. Kropotkin’s idea of anarchism as a “scientific” ideology was popular in anarchist circles, as was the appreciation of scientific development: many readers of *Pensiero e Volontà* wrote to the magazine expressing their doubts or explicit disagreement with Malatesta’s arguments.[269] He responded patiently to the criticism, specifying that he was not against scientific development, and described himself as a man of science rather than a philosopher.

After Malatesta’s death in 1932, his writings entered the “canon” of classic anarchist thought. Malatesta’s work actually diffused ubiquitously and consistently within European, Northern and Southern American anarchist movements. His political writings have been translated and circulated in many languages, also thanks to their brevity and readability. The first notable Malatestian posthumous anthology published in Italian was by his close friend and fellow anarchist Luigi Fabbri, shortly after Malatesta’s death.[270] This collection was, however, in chronological order, therefore does not show whether Malatesta’s discourses on science and technology played a specific role.

But the following Italian and English language publications of Malatesta’s writings prominently featured his critique of Kropotkin’s determinism, and his thoughts on science and technology in general. This suggest there was Technopolitical Resonance between the editors of these volumes and Malatesta, based on the Principle of Hopeful Curiosity: the editors made a specific choice when giving visibility to his writings on techno-scientific knowledge. In 1947, a collection of Malatesta’s

268 Malatesta, 173.
269 Errico Malatesta, “Scienza e Anarchia,” *Pensiero e Volontà*, September 1925.
270 Errico Malatesta, *Scritti*, ed. Luigi Fabbri, 3 vols. (Il Risveglio, 1934).

selected writings was published in Italy, edited by anarchist organizers and intellectuals Giovanna Caleffi and Cesare Zaccaria. The collection's first section, titled "against systems," featured two items mobilizing the Principle of Hopeful Curiosity: one about the dangers of science as a dogmatic endeavor, and an extract from the debate against Kropotkin's determinism. Later collections prominently featured these discourses.[271] The same is true for the English-language circulation of Malatesta's work. A couple of decades after the "selected writings" by Caleffi and Zaccaria, the first English anthology on Malatesta was published. This was *Errico Malatesta: His life and ideas* (1965), edited by Vernon Richards and frequently reprinted.[272] Richards assembled a section on "Anarchism and Science" including the critique of Kropotkin. This section was also in a prominent position in the book, before much more classical themes such as "Anarchism and Freedom."

Furthermore, with his canonization among the founding fathers of anarchism, Malatesta's mobilizing emotional practices also became regulating emotional practices. This did not imply that all Italian anarchists started to agree with Malatesta. However, the next generation of militants had to confront these technopolitical feeling-thoughts by Malatesta in order to propose new ones (if any). Ultimately, Malatesta's writings remained an important source for the Principle of Hopeful Curiosity's Technopolitical Resonance in the 20th century, as I will show in chapter 5.

2.1.2 "Science is a Superstructure": Antonio Gramsci's historicism

Antonio Gramsci, while imprisoned by the fascist regime, expressed a perspective on science and technology similar to Malatesta's, but more elaborated:[273] there was Technopolitical Resonance between Malatesta and Gramsci, based on the Principle of Hopeful Curiosity. This can be observed through Gramsci's emotional practices in his famous 1929-1935 *Quaderni del Carcere* ("Prison Notebooks")[274]. Contrary to Malatesta, however, these Gramsci's writings only became significant after his death, because for obvious reasons they did not circulate widely among Gramsci's contemporaries. His emotional practices were mobilizing rather than regulating, understandably because he was not in a position to "regulate" anything while in prison. Nor can it be said that these emotional practices fostered a re-politicization of science and technology in Gramsci's day, for the same reasons. But Gramsci's *Quaderni del Carcere* would have a significant influence on post-

271 See: Errico Malatesta, *Buon Senso e Utopia* (Eleuthera, 1999), and the 2018 revised edition.
272 Richards, born "Vero Recchioni" was a British-Italian anarchist, son of Italian anarchist immigrant Emidio Recchioni and married to Marie Louise Berneri, Giovanna Caleffi's daughter.
273 On Gramsci and science, see: Francesca Antonini, "Science, History, and Ideology in Gramsci's 'Prison Notebooks,'" *Journal of History of Science and Technology* 9 (2014): 64–80.
274 Antonio Gramsci, *Quaderni Del Carcere.* (Einaudi, 1977).

WWII Italian (and international) Marxism: his technopolitical feeling-thoughts also informed regulating emotional practices, and fostered a re-politicization of computer debates.

Gramsci was a humanities scholar, and whereas Malatesta's critique of Kropotkin was based on "scientific" reasoning, his arguments were explicitly philosophical. In his early 1930s *Quaderni del Carcere*, Gramsci developed a lengthy and articulated criticism of Nikolai Bukharin, a leading Soviet philosopher of science and technology.[275] Gramsci described the arguments in Bukharin's *The Theory of Historical Materialism* (1921) as a form of "Positivistic Aristotelianism,"[276] which could be politically useful at first, but eventually led to de-politicization. Gramsci points out how Bukharin's perspective can mobilize positive emotions among the "subaltern," serving as a comforting discourse in moments of defeat, but in the long run does not lead to the subaltern's real emancipation. Gramsci is thus mobilizing skepticism, and concerns about Bukharin's "Positivistic Aristotelianism" as a sort of faux Principle of Hope, which does not foster political agency but weakens it. According to Gramsci, faith in scientific determinism could be strategically important in the early stages of class consciousness among "subaltern" social subjects: "When you don't take the initiative in a struggle and this struggle ends up being a series of defeats, mechanical determinism becomes a formidable force of moral resistance, of cohesion, of patient and tenacious perseverance. I am momentarily defeated, but the force of things works for me on the long term."[277] However, Gramsci admonished, if this determinism was fostered by intellectuals, it caused "passivity and idiotic self-sufficiency, without waiting for the subaltern to take charge and responsibility."[278]

Furthermore, according to Gramsci, "It is the very same notion of 'science' as in the 'Popular Manual'[279] that we have to critically destroy; it comes from the natural sciences, as if they were the only science or the science 'par excellence,' as it was established by positivism."[280] This sentence exemplifies the "scientific curiosity" aspect of the Principle of Hopeful Curiosity. Gramsci stressed that the success of a certain scientific methodology in a certain knowledge domain did not imply its

275 Prison Book 11.

276 Gramsci, *Quaderni Del Carcere* 11, par 14, 1402.

277 "Quando non si ha l'iniziativa nella lotta e la lotta stessa finisce quindi con l'identificarsi con una serie di sconfitte, il determinismo meccanico diventa una forza formidabile di resistenza morale, di coesione, di perseveranza paziente e ostinata. 'Io sono sconfitto momentaneamente, ma la forza delle cose lavora per me a lungo andare ecc'." Gramsci, *Quaderni Del Carcere* 11, par 12, 1388.

278 "Quando viene assunto a filosofia riflessa e coerente da parte degli intellettuali, diventa causa di passività, di imbecille autosufficienza e ciò senza aspettare che il subalterno sia diventato dirigente e responsabile" Gramsci, *Quaderni Del Carcere* 11, par 12, 1388.

279 This was *The Theory of Historical Materialism. A Manual of Popular Sociology* (1921), by Nikolai Bukharin, usually called by Gramsci "saggio popolare" ("popular manual").

280 "Ma è il concetto stesso di «scienza», quale risulta dal Saggio Popolare, che occorre distruggere criticamente; esso è preso di sana pianta dalle scienze naturali, come se queste fossero la sola scienza, o la scienza per eccellenza, cosi come è stato fissato dal positivismo." Gramsci, *Quaderni Del Carcere* 11, par 15, 1404.

suitability for other knowledge domains, an issue Malatesta had also raised. Indeed, as Gramsci pointed out, natural sciences were not perfectly objective nor eternal: scientists could make errors, or newly developed scientific theories could make previous ones obsolete. For example, Bukharin had argued that the atomic theory proved that individualism was a fallacy. However, Gramsci questioned, "Is the modern atomic theory a 'definitive' theory, established once and for all? Which scientist would dare to say so? Isn't it rather a scientific hypothesis like others, which could be absorbed in a wider and more comprehensive theory?"[281] Ultimately, science was not above social and historical "superstructures": it was itself a superstructure, and thus a product of history.

Gramsci further demonstrated how important Scientific Curiosity was for him by criticizing the "speculative idealism" of Benedetto Croce, one of the most influential Italian philosophers.[282] This criticism also encouraged the re-politicization of science and technology: whereas Bukharin put excessive emphasis on science, Croce put too little. This was a problem for Gramsci too, because it prevented the population from fully understanding both the limits and the opportunities of techno-scientific development. For Croce, philosophy was ultimately superior to science. Gramsci, conversely, had a more balanced view of the relationship between "scientific" and "humanistic" knowledge: each had its own knowledge domain, and needed each other. Gramsci pointed out, "we should note that beside the most superficial infatuation for science, there is actually a wider ignorance of scientific facts and methods, very difficult things which become even more difficult because of the progressive specialization in new research fields."[283] This ignorance could only be countered by improving people's science education. Gramsci later observed, "since we are expecting too much from science, we look at it as some form of superior witchcraft, and therefore we are not able to realistically evaluate the concrete possibilities science offers."[284] This argument established Technopolitical Resonance with Malatesta's anarchist program. Ultimately, according to Gramsci, Croce's philosophy turned into positivism as much as Bukharin's, because they both denied the importance of socially constructing scientific thought.

281 "La teoria atomistica moderna è una teoria «definitiva» stabilita una volta per sempre? Chi, quale scienziato oserebbe affermarlo? O non è invece anch'essa semplicemente una ipotesi scientifica che potrà essere superata, cioè assorbita in una teoria piu vasta e comprensiva?" Gramsci, *Quaderni Del Carcere* 11, par 30, 1445.

282 Francesca Antonini, "Science, History, and Ideology in Gramsci's 'Prison Notebooks.'"

283 "È da notare che accanto alla più superficiale infatuazione per le scienze, esiste in realtà la più grande ignoranza dei fatti e dei metodi scientifici, cose molto difficili e che sempre più diventano difficili per il progressivo specializzarsi di nuovi rami di ricerca." Gramsci, *Quaderni Del Carcere* 11, par 39, 1458.

284 "Poiché si aspetta troppo dalla scienza, la si concepisce come una superiore stregoneria, e perciò non si riesce a valutare realisticamente ciò che di concreto la scienza offre." Gramsci, *Quaderni Del Carcere* 11, 1459.

Gramsci's prison notes were not circulated as immediately as Malatesta's writings. Einaudi first published Gramsci's notebooks in Italy between 1948 and 1951, then the Gramsci Institute[285] published a critical edition in 1975. Palmiro Togliatti, who founded the Italian Communist Party (PCI) with Gramsci and was its secretary until 1964, personally oversaw the first edition. However, while Gramsci's thoughts became one of the main ideological inspirations for the PCI, and therefore a possible source of regulating emotional practices, his perspective on science and technology was not immediately promoted. PCI post-WWII debates on science and technology were mostly influenced by philosopher of science Ludovico Geymonat, whose work combined neopositivism with dialectic materialism.[286] Geymonat promoted the importance of scientific knowledge within Italian Marxism, filling the gap between a "humanities" and "scientific" culture that Gramsci had already identified in the 1930s.[287] But Geymonat also criticized Gramsci for failing to elaborate on scientists' specific role as intellectuals, and therefore following the same line of thought as Croce.

With the 1970s Marxism's cultural turn, Gramsci's views on scientific development became internationally popular,[288] fostering a re-politicization of computer debates also within Italian Marxism. But the actors establishing Technopolitical Resonance with Gramsci were not necessarily the most devoted party members. On the contrary, some of them were independent or even dissident intellectuals, as further discussed in chapter 4.

285 A cultural organization set up by the Italian Communist Party

286 Geymonat joined the PCI during WWII, and only left in the mid-1960s, to join the more leftist "Proletarian Democracy" (Democrazia Proletaria). As a leading philosopher of science, Geymonat was not only influential among Marxist intellectuals. From the 1960s, he was editor in chief of the *Enciclopedia della Scienza e della Tecnica* (EST), inspired by the McGraw-Hill *Encyclopedia of Science & Technology* and directed UTET's collection on "Science Classics." From 1970, Geymonat helped curate a 6 volume *History of philosophical and scientific thought* edited by Garzanti, publishers renowned for their thematic encyclopedias. See *Il Pensiero Unitario Di Ludovico Geymonat*, Edizioni Nuova Cultura, 2004. On the influence of his work in Italy: Giuliano Pancaldi, "The History and Social Studies of Science in Italy," *Social Studies of Science* 10, no. 3 (1980): 351–74.

287 This consideration is not as obvious as it seems: as discussed in chapter 1, Italian intellectuals of any political faith always suffered from this gap due to the influence of Croce, a staunch idealist.

288 Gramsci is seen as a key intellectual who shaped STS and the contemporary history of science. See: Pietro D. Omodeo, "After Nikolai Bukharin: History of Science and Cultural Hegemony at the Threshold of the Cold War Era," *History of the Human Sciences* 29, no. 4–5 (October 2016): 13–34; Agustí Nieto-Galan, "Antonio Gramsci Revisited: Historians of Science, Intellectuals, and the Struggle for Hegemony," *History of Science* 49, no. 4 (December 2011): 453–78.

2.2 A paternalist master, an insurmountable loss, a technopolitical visionary. Three resonant portraits of Adriano Olivetti

Adriano Olivetti can be easily defined the most famous Italian computer entrepreneur. The Olivetti company was established by his father Camillo in the late 19th century, and became a renowned producers of typewriters and office equipment. In the years of the fascist regime, Adriano Olivetti became head of the family company and, after WWII, begun his computer endeavor. This did not last for long: Adriano died in 1960, and the family chose to sold the computer division, putting an halt to Adriano's plans.

Beside his effort in the computer sector, Adriano Olivetti is also remembered for his interest in politics. In 1945, he published a famous book containing his proposal for constitutional and federal State reform: *L'Ordine Politico delle Comunita* ("The Political Order of Communities"). The publishing of this book sanctioned attributing the quality of "utopian" to Adriano Olivetti and his political views.[289] Yet, as Davide Cadeddu points out, labeling a political vision as "utopian" is often a "furtively ideological" categorization,[290] and has prevented full appreciation of Adriano Olivetti's vision within academia and political circles. Indeed, Malatesta and Gramsci did not know of Olivetti's political thought, and Adriano Olivetti was not considered a political thinker equal to Gramsci and Malatesta. Adriano Olivetti's political views have often been misunderstood and misappropriated, leading to his frequent characterization as a "paternalist industrialist and a visionary utopian."[291]

My line of inquiry, however, is precisely the mythography of Adriano Olivetti: I am not interested in the specifics of his political thought, but rather in how his legacy influenced Italian computer debates and design. Although a well-known and respected industrialist, Adriano Olivetti was also a controversial figure in his lifetime: his early categorization as "utopianist" could have been a way to marginalize him from the political debate. However, his legacy (including alleged "utopianism") became a powerful source of re-politicization (but at times also de-politicization) of computer debates in Italy, especially in opposition to the Black Box Entanglement.

289 Davide Cadeddu, *Reimagining Democracy. On the Political Project of Adriano Olivetti.* (Boston: Springer, 2012), 2.
290 Cadeddu, 1.
291 Davide Cadeddu, *Towards and Beyond the Italian Republic. Adriano Olivetti's Vision of Politics* (Palgrave Macmillan, 2021), 200.

I therefore present the history and legacy of Adriano Olivetti by discussing three typical characterizations of him and his company. I call these "three resonant portraits" because each one points to a larger set of emotions performed in Italian computer debates. I begin with the criticism of "Padrone Olivetti" (Master Olivetti), a generic term identifying the management of the company before and after Adriano, which corresponds to portraying him as a "paternalist industrialist." This depiction hints at mobilizing emotional practices based on Working Class Pride in Italian socialism, a topic I will discuss in connection with computer debates in chapter 3. Then, I move to the sale of the Olivetti electronic division, described as "a missed opportunity," mobilizing a local version of Fear of Falling Behind. However, this fear of falling behind was not informed by the Black Box Entanglement, because it also fostered Scientific Curiosity. This resonant portrait, which I return to in chapter 4, was often mobilized to decry the Italian government's lack of investment in technology. Finally, I discuss what is arguably the most popular portrayal of Adriano Olivetti, that of "a man ahead of his time." This portrait shows the Technopolitical Resonance existing between Olivetti, Gramsci and Malatesta, based on the Principle of Hopeful Curiosity.

2.2.1 "Padrone Olivetti": not a fascist, but still a capitalist

The relationship between Adriano Olivetti and his workforce has been the subject of contrasting narratives. One of Adriano Olivetti's most praised attributes was his commitment to workers' well-being, personal and professional development. He was depicted as "a man ahead of his time" regarding working relationships, even a precursor of "corporate social responsibility," as I discuss at the end of this section. But Adriano Olivetti was also a private entrepreneur, and therefore in Marxist terms, a capitalist. Consequently, the Italian Communist Party and other left-wing organizations were not particularly sympathetic towards him. They did not consider him a visionary, nor an enlightened entrepreneur, but "a master," and this narrative was also directed at the Olivetti company after Adriano's death.

The "Padrone Olivetti" depiction prominently mobilized pride, but not in a "visionary utopian": it was Working Class Pride against the bourgeoisie, to which Adriano Olivetti clearly belonged. Powerfully exemplifying this emotional portrayal is the political song "Padrone Olivetti" released in 1968, eight years after Adriano's death.[292] In the eyes of "Master Olivetti," the song claimed, "a machine or a man has the same function," and whatever (or whoever) was not useful for production

292 From the "Pisa Songbook" (Canzoniere Pisano), a collection of political songs relating to workerism and autonomist Marxism.

had to be discarded. A fundamental argument was that this generic "Master Olivetti" divided the workforce in order to pursue his interests. "Divide and rule: this has always been the motto, // Of all the masters of this earth, // Our life is a constant war // To avoid being scammed,"[293] the "scam" being the idea that there could be masters who genuinely cared about the working class. The song ended by calling for workers' unity and solidarity: "We are all equal without power // and united we shall fight!"[294]

"Padrone Olivetti" also represents the ties between the history of Olivetti as a company and the development of Workerism (Operaismo), a left-communist current which attached fundamental importance to workers as drivers of the socialist revolution. The genesis of Workerism, and Italian debates on technology's role in the workers movement, were highly influenced by Marx's *Grundrisse*,[295] earlier than in the English-speaking world.[296] The iconic 1961 essay "On the capitalist use of machines in neocapitalism",[297] by Raniero Panzieri in the journal *Quaderni Rossi* ("Red Notebooks"),[298] provided a sharp critique of how machines reproduced capitalism, stressing that "technological progress is then a form of capital, its development."[299] This criticism was not levelled against technology. Reflecting the title of this essay, the problem was "the capitalist use of machines," not the actual machines. Panzieri's article highlighted that the centrality of workers should not be forgotten when dealing with technology. He observed that "concerning technological 'rationality,' revolutionary action should 'understand' it. Not recognize and exalt it, but put it to a new use: the socialist use of machines."[300] Panzieri's argument established Technopolitical

293 "Dividi e comanda: è il motto di sempre, // Di tutti i padroni di questa terra, // La nostra vita è tutta una guerra // Per stare attenti a non farsi fregà!" Padrone Olivetti, Canzoniere Pisano.

294 "Siam tutti uguali senza il poter // E tutti insieme dovremo lottar!" Padrone Olivetti.

295 Karl Marx, *Grundrisse der Kritik der Politischen Ökonomie*, 1857-8.

296 The first Italian version appeared between 1968 and 1970 and was translated into English in 1973. See: Karl Marx, *Lineamenti Fondamentali Della Critica Dell'economia Politica, 1857-1858*, trans. Enzo Grillo, 2 vols. (Firenze: La Nuova Italia, 1968). In 1957 already, left-communist Amadeo Bordiga criticized the promises of automation based on the *Grundrisse* analysis. In a published conference speech, he observed that an increased use of machines in production would not necessarily improve conditions for workers. See: Amadeo Bordiga, "Traiettoria e Catastrofe Della Forma Capitalistica Nella Classica Monolitica Costruzione Teorica Del Marxismo (1)," *Il Programma Comunista*, 1957.

297 Raniero Panzieri, "Sull'uso Capitalistico Delle Macchine Nel Neocapitalismo," *Quaderni Rossi* 1, no. 1961 (1961): 53–72. Panzieri's reasoning was further developed by Mario Tronti, Toni Negri, Paolo Virno and others. For an interpretation of Marx writing on Italian workerism, see: Massimiliano Tomba and Riccardo Bellofiore, "The 'Fragment on Machines' and the Grundrisse: The Workerist Reading in Question," in *Beyond Marx* (Brill, 2014), 345–67.

298 *Quaderni Rossi* (Red Notebooks) were important for developing Workerism, the first publication of many theories developed later.

299 "Lo stesso progresso tecnologico si presenta quindi come modo di esistenza del capitale, come suo sviluppo." Panzieri, "Sull'uso Capitalistico Delle Macchine Nel Neocapitalismo," 54.

300 "rispetto alla 'razionalitá' tecnologica, il rapporto ad essa dell'azione rivoluzionaria è di 'comprenderla', ma non per riconoscerla ed esaltarla, bensí per sottometterla a un nuovo uso: all'uso socialista delle macchine," Panzieri, 63.

Resonance with Malatesta's *Fra Contadini* dialogue, as he did not propose the destruction, but re-appropriation of machines.

However, in terms of de/re-politicization of computer debates, the "Padrone Olivetti" depiction had mixed outcomes. On the one hand, it re-politicized debates on working relationships at Olivetti, by "demystifying" the grand narrative on Adriano Olivetti and by stressing the importance of other historical forces in negotiating these relationships, from the company workforce to larger economic processes. But this re-politicization mostly happened on the macro-political level, focusing on the organization of work at Olivetti, and how the promise of improved working conditions through automation was not met. In these discourses, the machines Olivetti *used* were more important than the ones Olivetti *produced*. Criticism of the "capitalist use of machines" ultimately dominated the quest for the "socialist use of machines." Eventually, this emphasis on "capitalist use" contributed to de-politicizing the micro-politics of computers: when Working Class Pride became Class Hatred, it resulted in a simple rejection of the technology, as I discuss in chapter 3. But for now, back to Working Class Pride at Olivetti.

One of the first practical case studies discussing Panzieri's theory involved Olivetti workers. In the second and third issue of *Quaderni Rossi* (1962, 1963), Romano Alquati published a two-part report on working conditions at Olivetti.[301] This document was written with Olivetti factory workers and followed Alquati's similar report on FIAT. The Olivetti report was the most extensive and detailed case study published in *Quaderni Rossi*.[302] The analysis of working conditions at Olivetti notably introduced the notions of "class composition" and "mass worker" which became fundamental in Workerist theory.[303]

Working Class Pride was a crucial emotion in the report. Alquati showed how, even in an "enlightened" company like Olivetti, the new technology-intensive capitalist organization of work was disempowering for the working class.[304] The report harshly criticized Adriano Olivetti's much celebrated cultural commitments to sociology. Workers reported that research at Olivetti, led by

301 Romano Alquati, "Composizione Organica Del Capitale e Forza-Lavoro Alla Olivetti," *Quaderni Rossi* 2 (1962): 63–98, and "Composizione Del Capitale e Forza Lavoro Alla Olivetti," *Quaderni Rossi* 3 (1963): 119–85.

302 Steve Wright, *Storming Heaven* (Pluto Press, 2002).

303 Wright, 46-58; Maria Turchetto, "From 'mass Worker' to 'Empire': The Disconcerting Trajectory of Italian Operaismo," in *Critical Companion to Contemporary Marxism* (Brill, 2008), 285–308. Alquati's report on FIAT deals with the more "practical" side of Workerism: it was at FIAT that important worker protests started in the late 1960s, and continued through the 1970s.

304 On the relationship between workerism and computers, see: Matteo Pasquinelli, "Italian Operaismo and the Information Machine," *Theory, Culture & Society* 32, no. 3 (2015): 49–68.

popular “left-wing” sociologists, resulted in worse working conditions.[305] Alquati observed that the company was a particularly interesting object of study because in the early 1960s, Olivetti was becoming a “big enterprise like any other.”[306] However, this transformation was not thanks to Adriano being “a man ahead of his time” or because there was a “missed opportunity.” On the contrary, this transformation was described as an inevitable outcome in the path towards “neocapitalism” undertaken years ago: “The truly exceptional fact about Olivetti, in our opinion, is the persistence of a well-constructed mystification, while its internal and external politics are the essence of despotism, outside Ivrea and Turin it has the fame of a model enterprise.”[307] The notion of a “persistent mystification” must be stressed here, as it claimed a continuity between the old and the new management.

The Italian Communist Party (PCI) was also very critical of Adriano Olivetti, mobilizing skepticism about his commitment to improve workers’ welfare. The PCI aversion was not only due to the party’s close proximity to labor unions, but also because Adriano Olivetti became a direct rival at a parliamentary political level. After the war, Adriano founded his own political movement and party: the “Community Movement” (Movimento di Comunitá), based on a mixture of socialism, liberalism, and federalism.[308] The movement did not establish a relevant national presence, but became popular in the area around Ivrea, and in the 1958 national elections, Adriano Olivetti secured a seat in the Italian parliament.

Unsurprisingly, when Adriano Olivetti died, PCI newspaper *l’Unità* published an unforgiving portrait of the man. He was recognized as a sort of innovator, but most importantly because he managed to imprint “neocapitalism” on his company, and his political actions, “basing the attack on the working- class autonomous institutions on a complex and updated series of paternalistic tactics, rather than a blatant fascist-type repression.”[309] The newspaper article focused more on Adriano Olivetti’s political and managerial vision than his investments in electronics. His political project and reputation as an “enlightened entrepreneur” were (more or less subtly) mocked. The piece

305 Alquati, “Composizione Organica,” 73.
306 Alquati, 79.
307 “Il fatto veramente ‘limite’ della Olivetti dunque a noi pare soprattutto il persistere di una ben costruita mistificazione, per cui essa mentre nella sua politica interna ed esterna è il non plus ultra del dispotismo, ha fuori di Ivrea e di Torino una fama di azienda modello” Alquati, 79.
308 Cadeddu, *Reimagining Democracy.*
309 “Olivetti [è] riuscito assai meglio della Fiat -negli anni scorsi- a dare un carattere “neocapitalista” alla sua azione aziendale e politica, fondando l’attacco alle istituzioni autonome della classe operaia piú su una serie complessa e aggiornata di tattiche paternalistiche che non su una smaccata repressione di tipo fascista.” Adalberto Minucci, “Adriano Olivetti Muore Sul Treno Milano-Losanna,” *L’Unità*, February 29, 1960. These references to fascism were very common in left-wing discourses. Although arguably an ideological exaggeration, they were based on the historical genesis of Mussolini’s fascism, which industrialists supported to counteract workers’ strikes.

concluded with the Community Movement's failures, favorably noting how from 1959, labor unions were regaining ground in the factories.

The "Padrone Olivetti" portrait was rather harsh towards Adriano, yet pointed out some truths. Adriano Olivetti did have a patronizing attitude, confirmed by the fact that his political movement and party did not survive him. Furthermore, his "utopian" political project was actually quite elitist, as he envisioned a highly educated and highly skilled aristocracy governing through limited democratic participation.[310] And despite being an eclectic capitalist, he was still a capitalist: the hostility with the PCI was clearly reciprocal. He in fact tried to sabotage the PCI in order to advance his company. In 1954, then again in 1960, Adriano asked the director of the Central Intelligence Agency (CIA) for funding, suggesting that the Community Movement could be an anti-communist ally in Italy.[311]

At the same time, we should recognize that Adriano Olivetti was quite different from the average Italian "master." For example, he would openly criticize other Italian entrepreneurs for being too profit-centered and not reinvesting enough in the common good. And, as I discuss later, his cultural engagement was indeed remarkable. The Olivetti workers who Alquati interviewed were disappointed with the company's sociologists. But intellectuals and writers who worked with Olivetti later fostered a critical, yet open perspective towards computers within socialist circles.

2.2.2 Olivetti's electronics division: a "missed opportunity"

After Adriano's death, the Olivetti company faced a crisis. Adriano's plans were not only ambitious, but also expensive: at the time of his death, he had left the company with substantial debts. Furthermore, family conflicts arose over who should take leadership of the company, which did not reassure investors. These financial and leadership crises eventually led to the sale of Olivetti's electronic division.

This sale generated another resonant portrait, that of Olivetti's electronic division as "a missed opportunity." This notion became particularly popular in the 1970s. An important milestone was a work by journalist Lorenzo Soria. In 1979 he published a book about the sale of Olivetti's electronic division, titled *Informatica: Un'Occasione Perduta. La divisione elettronica dell'Olivetti nei primi*

310 Cadeddu, *Towards and Beyond the Italian Republic,* 110
311 Paolo Bricco, *L'Olivetti Dell'ingegnere* (Bologna: Il Mulino, 2014), 26.

anni del centro sinistra ("Information technologies: a missed opportunity. Olivetti electronic division in the first years of the center-left").[312] According to Soria, the financial situation at Olivetti was not as bad as described in the 1960s. The Italian State had a long history of providing huge funds to national businesses, thus larger State involvement in Olivetti was not an outlandish idea. This narrative was revitalized and updated in 2003, with the publication of the book *La scomparsa dell'Italia industriale* ("The disappearance of industrial Italy"), by Luciano Gallino, who had worked at Olivetti as a sociologist.[313] This work underlined the State's incompetence and disinterest as key reasons for the "disappearance" of Olivetti's electronic division, as well as other Italian companies.

The depiction of this "missed opportunity" mobilized pride, now not in opposing a "paternalist industrial" but in supporting a "utopian visionary." This portrait also mobilized shame and indignation against those responsible for the "missed opportunity." The accusation was clearly political. Depicting Adriano Olivetti as "a man ahead of his time" implied that the electronic division was sold because he had taken a step too long for his leg: the blame fell indirectly on Adriano. But the "missed opportunity" narrative reverted the situation: it was not inevitable that the electronic division would be sold. There was actually great potential, but because of the incompetence of those responsible, the opportunity was ultimately lost.

From the 1970s, the Olivetti story therefore became a typical example of why technological innovation was lacking in Italy, fostering a re-politicization of computer debates at both the macro and micro-political level. The decision to sell Olivetti's electronic division, and whether or not this was avoidable, was often questioned. Soria's book became a much-quoted reference. The Italian Communist Party, engaging increasingly in political debates on computers, readily used the Olivetti case to point out that the Christian Democracy party was neither interested in—nor capable of—encouraging technological development in Italy. As I show in chapter 4, regaining control of Olivetti's electronic division became a central aim in the PCI's plans for computers. The "missed opportunity" scenario sustained an alternative macro-political and micro-political vision. At times, PCI debates used the Socialist Fear of Falling Behind to promote local investment in computers. But, overall, the "missed opportunity" discourse was a significant counterweight to the Fear of Falling Behind which sustained the Black Box Entanglement: how was it possible to "fall behind" when Italy had a computer pioneer like Adriano Olivetti?

312 Lorenzo Soria, *Informatica: Un'occasione Perduta. La Divisione Elettronica Dell'Olivetti Nei Primi Mesi Del Centro-Sinistra* (Einaudi, 1979).
313 Luciano Gallino, *La Scomparsa Dell'Italia Industriale* (Einaudi, 2003).

The “missed opportunity” portrait also highlights a second reason why the promises and threats of the Black Box Entanglement were not as credible in Italy as in the USA. There was a fundamental difference in how the US and Italian governments supported (or not) scientific and technological developments. After WWII, Italy could not afford to invest massively in developing new technologies like the USA. Many areas had to be rebuilt from the ground, and achieving technological superiority was not a central necessity. It is therefore not surprising that Adriano Olivetti’s entrepreneurial initiative in computers did not receive the same state support as his US counterparts, namely IBM founder Thomas Watson senior and his son Thomas Watson junior. While US citizens were witnessing their Sputnik-induced “technological boom,” Italians were in their “economic boom” years.[314] But Italy did not have a government-sponsored mobilization of Fear of Falling Behind sustaining investments in advanced and innovative technologies such as computers. This investment was not even happening: the consolidation of Italian industry was carried out in more “traditional” areas, for example the automotive, chemical, and small electric-appliances sectors, and continued to rely on the availability of a low-paid and low-skilled workforce rather than foster industrial innovation.[315] Thus, the push for greater investment in computer technologies, and the interest in computers generally did not come from the government nor from the entire entrepreneurial sector. Rather, this interest was often fostered by left-wing parties and organizations,[316] and an individual entrepreneur like Olivetti who received little support from his peers or the State.

Adriano Olivetti’s pioneering endeavors began in the late 1940s. He was becoming more and more interested in electronics, envisioning his company’s transition from the mechanical to the electromechanical and ultimately electronic sector, particularly computer manufacturing. The first step in this transition was the electromechanical calculator Divisumma 14 in 1948, designed by factory-worker-turned-engineer Natale Capellaro. In 1949, Olivetti entered into a partnership with French company Bull to sell data processing centers. Two years later, in 1952, Olivetti opened a research center for electronic calculators in New Canaan, USA. In 1955, Olivetti set up a project with the University of Pisa to make an electronic calculator called “Pisa Electronic Calculator”

314 Ginsborg, in *A History of Contemporary Italy,* places the Italian miracle between 1958 and 1963.

315 Alessandro Nuvolari and Michelangelo Vasta, “The Ghost in the Attic? The Italian National Innovation System in Historical Perspective, 1861–2011,” *Enterprise & Society* 16, no. 02 (2015): 270–90; Pier Angelo Toninelli and Michelangelo Vasta, “Opening the Black Box of Entrepreneurship: The Italian Case in a Historical Perspective,” *Business History* 56, no. 2 (2014): 161–86.

316 Pogliano, Claudio. “Le Nuove Macchine: Inquietudine e Seduzione.” In *Storia d’Italia. Annali 26. Scienze e Cultura Dell’Italia Unita*, edited by Claudio Pogliano and Francesco Cassata. Einaudi, 2011.

(Calcolatrice Elettronica Pisana, CEP), establishing its first computer research lab under the direction of Italian-Chinese engineer Mario Tchou. Olivetti founded a semiconductor company in 1957 (Societá Generale Semiconduttori, SGS), merging with Italian semiconductor manufacturer Telettra. SGS was specifically set up to sustain Adriano's most ambitious computer project: the ELEA 9003, the first commercial transistorized computer produced in Italy, and one of the first in the world.[317] ELEA was developed between 1957 and 1959. Around 40 of these computers were commercialized. All the while, the company was booming in the typewriter market, releasing a series of very successful models such as the iconic Lettera 22 in 1950. By the end of the 1950s, Adriano decided to purchase his main rival in the typewriter market, the US-based Underwood Typewriter Company. But he would not live long enough to complete any of these projects: on February 27, 1960, Adriano Olivetti died in a train, aged 59, after suffering a brain hemorrhage.

After Adriano's death, the company was taken over by his eldest son, Roberto, who continued to pursue his father's vision. In 1962, Pier Giorgio Perrotto developed the famous Programma 101, a programmable electronic desktop calculator, which Italians often claim was the first personal computer.[318] However, when Programma 101 was commercialized in 1965, Olivetti was not anymore "just" Olivetti.

In 1964, for the first time, the Olivetti board had nominated a president outside the family: Bruno Visentini, who then persuaded the Olivetti family to invite new stakeholders into the company.[319] Visentini, also president of the Institute for Industrial Reconstruction (Istituto per la Ricostruzione Industriale, IRI),[320] assembled a group of private entrepreneurs (FIAT, Pirelli and La Centrale), backed by two State-controlled banking institutes. Visentini's proposal generated much criticism both inside and outside Olivetti, particularly due to the presence of FIAT, the car company owned by the influential Agnelli family. FIAT, already one of the most powerful and State-supported Italian companies, was about to gain significant control over Olivetti for a relatively small economic price.

317 On the history of ELEA, see: Elisabetta Mori, "Olivetti ELEA Sign System: Interfaces Before the Advent of HCI," *IEEE Annals of the History of Computing* 42, no. 4 (October 2020): 24–38; Elisabetta Mori, "The Italian Computer: Italy's Olivetti Was an Early Pioneer of Digital Computers and Transistors," *IEEE Spectrum* 56, no. 6 (2019): 40–47; Massimo Guarnieri, "Early Italian Computers: Mario Tchou's ELEA 9003," *IEEE Industrial Electronics Magazine* 14, no. 2 (2020): 73–92; Giuditta Parolini, "Olivetti Elea 9003: Between Scientific Research and Computer Business," in *IFIP International Conference on the History of Computing, IFIP Advances in Information and Communication Technology* (Springer, 2008), 37–53.

318 As is the case with such claims, the story is more complicated, but Programma 101 was certainly among the first of its kind.

319 Shortly after, Visentini nominated the first CEO outside the family: Aurelio Peccei.

320 This was the main national institution financing businesses.

Adriano's untimely death and the sale of the Olivetti electronic division not only ended the opportunity to develop an internationally competitive Italian computer industry. These events also fostered an Olivetti myth which became a key point of reference in later computer debates. We could say that Adriano Olivetti's popularity increased after his death. This particularly applied to his standing in Italian left-wing politics. When he chose to found his own political party, Adriano automatically became a rival in the eyes of the two other socialist parties, the PSI and the PCI. At the same time, Adriano's unconventional managerial style also distanced him from the rest of the Italian entrepreneurial class, which he also openly criticized. But all these quarrels and rivalries became much less important when Adriano Olivetti passed away, and his computer investments were discarded.

The Italian Socialist Party (Partito Socialista Italiano, PSI) was very vocal against FIAT's heavy involvement in Olivetti affairs. Riccardo Lombardi, director of the official PSI magazine *Avanti!* observed that "a typically authoritarian logic of development and expansion like that of FIAT cannot tolerate a long coexistence with its opposite," namely the peculiar Olivetti organizational culture.[321] The Minister for Finance Antonio Giolitti, a PSI member, wrote to Prime Minister Aldo Moro suggesting that FIAT's seat should be replaced by the State-owned Institute for Industrial Reconstruction. This option was also favored by the PCI and workers unions.

Besides FIAT's increasing power, a main concern was that the new Olivetti stakeholders would not be willing to invest in the electronic division. Indeed, once the agreement was settled with FIAT as planned, one of the new Olivetti management's first moves was to get rid of the electronic division by selling 75% of it to General Electric. As famously noted by FIAT president Vittorio Valletta, Olivetti's electronic division was "a menace, a mole to extirpate."[322] In 1968, General Electric bought the remaining 25%, becoming the sole owner of the former Olivetti electronic division, including the Pregnana Milanese research lab where Programma 101 had been developed. In this way, Olivetti officially disappeared from the large and mid-size computer systems market.

According to Soria and Gallino, something could have been done to "save" Olivetti's electronic division. To better understand this claim, we need to look at Olivetti's range of electronic products. Regarding mainframe computers, after Adriano's death, the market remained in the hands of IBM

321 "Una logica di sviluppo ed espansione tipicamente autoritaria come quella rappresentata dalla FIAT non puó tollerare alla lunga la convivenza con il suo opposto". Riccardo Lombardi, "Ció che è in gioco all'Olivetti," *Avanti!*, March 27, 1964, in Soria, *Informatica: Un'occasione Perduta.*

322 Gallino, *La Scomparsa Dell'Italia Industriale.*

and a few other US producers. While Olivetti's electronic division was being sold to General Electric, the French company Bull was undergoing the same fate, although this was more of a disappointment for the French government. We can reasonably speculate that it was only a matter of time: sooner or later Olivetti would have abandoned the mainframe market. The situation with mid-sized computer systems was more favorable, and this can justifiably be seen as "a missed opportunity." In fact, when Honeywell bought the former Olivetti labs from General Electric in 1970, these computers were the main products. When it comes to even smaller sizes, not all was lost, on the contrary. The Olivetti company kept on producing electronic office appliances, for example video terminals. In 1978, when Carlo De Benedetti became CEO of Olivetti, the company tried again to enter the computer market, this time focusing on personal computers. In the 1980s, Olivetti became once more an important player in the computer market, for example with the popular model M24.[323] It must be noted that, at this stage, the company mostly assembled parts produced elsewhere, but this was the direction the computer industry was taking everywhere. Finally, the "missed opportunity" narrative usually omits the Olivetti legacy in the field of microelectronics. Società Generale Semiconduttori (SGS), founded to supply electronic parts for Olivetti, is still surviving today as part of STMicroelectronics, which has a production plant in Agrate Brianza (Milan).

There is also a final subset of the "missed opportunity" portrait, providing an alternative explanation of why Adriano's project to be a local computer manufacturer failed. This portrait can be called "Adriano Olivetti: a man who knew too much." It is essentially a conspiracy theory, and I do not want to give it credit by putting this on the same level as the other resonant portraits, which, although biased, were founded on proven and observable facts. Yet, to paint a fuller picture of the emotional legacy and the myth surrounding Adriano Olivetti, it is important to point out that after his death, all kinds of conspiracy theories and alternative interpretations of the "official" institutional truth emerged. In particular, there were rumors about CIA involvement in Adriano Olivetti's death, further reinforced by the equally unfortunate fate of Mario Tchou, head of the ELEA team, who passed away one year after Adriano. According to the rumors, they both died as a result of some extra secret CIA operation to stop the development of an Italian computer industry.

323 However, the 1980s boom in personal computers was short: like many other European and US companies, Olivetti was hit by the 1990s computer hardware crisis and eventually ceased manufacturing computers for the second (and last) time.

These allegations have never been proved, and they generally produce negative reactions also from former Olivetti workers.[324] It is true that the CIA was keeping an eye on Adriano Olivetti's activities, but both his and Mario Tchou's deaths were most likely from natural causes. In 1960, Adriano Olivetti, although only 59, died from a tragically premature but not particularly bizarre brain hemorrhage. In 1961, Mario Tschou, at the even younger age of 37, died in a car accident on a notoriously dangerous road, scene of many fatal accidents.

However, rumors of a CIA involvement in these deaths are noteworthy because they spread consistently in a variety of contexts, gaining much publicity in news outlets and non-academic books on the history of Olivetti. Recently, there has been a revival of these theories. A 2013 tv mini-series on Adriano Olivetti produced by RAI[325] included references to conspiracy theories. In January 2020, former Democratic Party secretary Walter Veltroni published an article about Mario Tchou in national newspaper *Corriere Della Sera*, hinting again at conspiracy theories around his death. In recent years, the Olivetti conspiracy theory has also attracted international attention: in 2019, US-based journalist Meryle Secrest published a book on this theory, again based on anecdotal evidence and allegations: *The Mysterious Affair at Olivetti. IBM, the CIA and the Cold War Conspiracy to Shut Down Production of the World's First Desktop Computer.*[326] The influential and (usually) authoritative newspaper *Il Corriere della Sera* gave the book a positive review[327] and it is being translated into Italian.[328]

This portrait combines the nostalgia and pride in the "man ahead of his time" narrative with the indignation of the "missed opportunity." However, like most conspiracy theories, they can have detrimental de-politicizing effects. Placing the blame for the demise of Olivetti's electronic division on some secret CIA plan masks the political responsibilities involved. True, Adriano Olivetti was well known as an eclectic entrepreneur; however, it is not necessary to show he was the target of a conspiracy theory in order to make his life and work historically significant.

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324 See: Gian Carlo Vaccari, "Commento all'articolo di W. Veltroni su M. Tchou", *Nel futuro*, 2020 (https://www.nelfuturo.com/Commento-all-articolo-di-W-Veltroni-su-M-Tchou, accessed September 20, 2022.); Giuseppe Silmo, "The mysterious affair at Olivetti: un commento," *Nel futuro*, 2020 (https://www.nelfuturo.com/The-Mysterious-Affair-at-Olivetti-Un-commento, accessed September 20, 2022.)

325 RAI is the public Italian TV service. The TV series was screened on RAI 1, the network's main channel.

326 Meryle Secrest. *The Mysterious Affair at Olivetti: IBM, the CIA, and the Cold War Conspiracy to Shut Down Production of the World's First Desktop Computer* (Knopf, 2019).

327 Costanza Rizzacasa d'Orsogna. "Nei Computer Dell'Olivetti s'intrufolò Un Baco: La Cia." *Corriere Della Sera, Inserto Lettura*, January 26, 2020.

328 The book's success in Italy is hardly surprising: it gives credit to the Olivetti conspiracy theory, and the popular claim that Programma 101 was "the first Personal Computer."

2.2.3 Adriano Olivetti: "a man ahead of his time"

"It would not be daring to say that Adriano Olivetti was 40 years ahead of his time,"[329] claimed sociologist and former Olivetti employee, Luciano Gallino in a lengthy interview on the history and legacy of Adriano Olivetti and his company. Gallino worked in Olivetti's Social Relations Research department for many years, and later became one of Italy's most renowned sociologists of work. Gallino's perspective on Olivetti was certainly sympathetic, but former employees were not the only ones who considered Adriano Olivetti "a man ahead of his time." This was arguably the most popular depiction of Adriano Olivetti after his death,[330] and became a powerful counterweight to the claims of the Black Box Entanglement. The portrait mobilized feelings of admiration and pride, even a certain nostalgia for a "Golden Age" when Olivetti was an internationally renowned computer producer.

However, it is not always clear in what sense Adriano Olivetti was "ahead." Several aspects of his life history could be considered exceptional, from his investment in computers to his management practices. Compared to whom was Adriano Olivetti ahead: other Italian entrepreneurs? European? Western Bloc? After claiming that Adriano Olivetti was 40 years ahead of his time, Luciano Gallino observed that the new century seemed to be going backward compared to Adriano's vision.[331] Indeed, this resonant depiction of Adriano Olivetti is arguably the most elusive. I address this depiction by focusing on its de/re-politicizing effect, and examining whether it amplified the Technopolitical Resonance of the Principle of Hopeful Curiosity. To do so, I pinpoint three areas in which Adriano Olivetti was reputedly ahead: in the business field, in the socio-political field, in the cultural field.

From a business perspective, the question here is whether Adriano Olivetti was an "exceptional" entrepreneur "ahead" of the current entrepreneurial spirit and practices. Tracing the early history of the Olivetti company should provide an answer. The company was founded in Ivrea (near Turin, in North-West Italy) at the end of the 19th century by Camillo Olivetti. Initially making electrical

329 "Non sarebbe azzardato dire di Adriano Olivetti ch'era in anticipo di quarant'anni rispetto ai suoi tempi", Luciano Gallino, *L'impresa Responsabile. Un'intervista Su Adriano Olivetti*, ed. Paolo Ceri (Edizioni di Comunità, 2001), 4.

330 Perhaps the most effective example of this popularity is the frequent (mis)appropriation of Olivetti's persona by political movements aiming to present themselves as "innovative." Examples are former Italian Prime Minister Silvio Berlusconi, Lega Nord politician Mario Borghezio, and the political movement, later political party, "Movimento 5 Stelle." See: Cadeddu, *Towards and Beyond the Italian Republic*; Marco Maffioletti, "The Ideal Enterprise between Factory and Community: An Intellectual Biography of Adriano Olivetti" (doctoral dissertation, Université de Grenoble, 2013).

331 Gallino, *L'impresa Responsabile*, 4.

measurement tools, Olivetti switched production and became the first Italian typewriter manufacturer—an astute decision that would make Olivetti an internationally renowned company. However, things changed in the late 1930s. Camillo's full name was Samuel David Camillo, and he was born into a Jewish family. When fascist dictator Benito Mussolini enforced racial laws in 1938, Camillo was luckier than the at least eight thousand Italian Jews deported to concentration camps, the great majority never to return.[332] He received special exemption thanks to "industrial merit," but was forced to hand over control of the company to his eldest son, Adriano, who was considered "Aryan" because his mother was not Jewish. Adriano ultimately became a successful industrialist and the most well-known Italian computer entrepreneur.

But was Adriano Olivetti ahead of his time in the business sector? Certainly, working on electro-mechanics and electronics was a clever idea, however we need to bear in mind that this is what a good entrepreneur would do: adapt their production to the changing times. Indeed, the idea of investing in computers did not appear out of thin air. Camillo Olivetti was actually trained as an electrotechnical engineer. Both Camillo and Adriano Olivetti spent time in the USA, witnessing new production lines and methods. They understood that an increasing number of products was transitioning from mechanics to electro-mechanics, and automation and electronics were growing business sectors. Adriano's investments, albeit bold, were not reckless. Creating the electronics division did not put a stop to existing production lines, and the company was enjoying discrete success in the typewriter sector. Finally, Adriano Olivetti was an avid reader: his business and management decisions were not "visionary" improvisations, but the result of his intellectual engagement with a broad scholarship, as I discuss later.[333]

Thus, the "businessman ahead of his time" portrait is the de-politicizing counterpart of the "missed opportunity." The history of Adriano Olivetti shows that he really was a (business)man of his time. We could argue that the rest of the Italian entrepreneurs were "behind" the times regarding technological innovation, specifically in computers. The Italian business sector tended to rely on a large, low-paid and unskilled workforce, rather than invest in innovative products or technologies.[334]

332 Official figures report 8,566 Italian Jews were deported, of whom 7,557 died. Robert S. C. Gordon, "The Holocaust in Italian Collective Memory: Il Giorno Della Memoria, 27 January 2001," *Modern Italy* 11, no. 2 (June 2006): 167–88.

333 Adriano Olivetti's library catalogue was published by Edizioni di Comunità: Laura Olivetti (ed), *La biblioteca di Adriano Olivetti* (Edizioni di Comunità, 2012).

334 Alessandro Nuvolari, Pier Angelo Toninelli, and Michelangelo Vasta, "What Makes a Successful (and Famous) Entrepreneur? Historical Evidence from Italy (XIX-XX Centuries)," *Industrial and Corporate Change* 27, no. 3 (2018): 425–47, Nuvolari and Vasta, "The Ghost in the Attic?"; Toninelli and Vasta, "Opening the Black Box of Entrepreneurship."

And this trend remained long after Adriano Olivetti's death. Calling Adriano Olivetti "ahead" of his time implies that at some point other entrepreneurs caught up with him, but this is not the case in Italy. Indeed, more than revealing Adriano's merits, this narrative adopts an apologetic undertone concerning other Italian entrepreneurs' rigid and conservative attitude. Therefore, we could consider Adriano Olivetti not ahead of his time but ahead of his geography.

Another source of Adriano Olivetti's exceptionalism relates to his engagement with societal and political issues. Borrowing from the "Padrone Olivetti" terminology, we can call this variation "a master ahead of his time." From this perspective, he was arguably a man "ahead of his time" because he deeply invested in the welfare of his workers, and saw that his enterprise should not only be devoted to economic profit, but also to the common good.[335] Like the interest in electronics, this was a typical family trait. Since Camillo's day, Olivetti factories were known for their particularly favorable working conditions, with good salaries and a managerial attitude based on what we would today call "corporate social responsibility." Camillo famously taught his son that, under no circumstances should he fire his workers.[336] Adriano maintained this organizational culture: during his time as director of Olivetti, he further invested in workers' facilities and welfare, and was personally involved in Ivrea's urban planning. Olivetti workers—and in some cases all the citizens of Ivrea—could enjoy a well-stocked library, a variety of cultural and social activities, vocational training schools, a factory nursery, healthcare centers, and an "Internal Solidarity Fund" as an additional source of income in case of workers' illness or accidents.[337]

Without diminishing the merit of this vision, one element must be considered when assessing its exceptionalism: as mentioned earlier, the Olivetti family was involved in socialist politics. Around the same time that he founded the company, Camillo joined the newly formed Italian Socialist Party (PSI). He became an active member and personal friend of socialist leader Filippo Turati. With the rise of fascism in the 1920s and after the murder of socialist deputy Giacomo Matteotti by order of Mussolini, Camillo eventually left the socialist party and dedicated himself full-time to his company. Adriano, on the other hand, remained active in socialist, anti-fascist resistance.

335 For an analysis of Adriano Olivetti's political vision, see: Cadeddu, *Towards and Beyond the Italian Republic*, and *Reimagining Democracy.*

336 See Gallino, *L'impresa Responsabile.*

337 Elisa Arrigo, "Corporate Responsibility in Scarcity Economy: The Olivetti Case," *Symphonya. Emerging Issues in Management*, no. 1 (2003): 114–34; Mauro Sciarelli and Mario Tani, "Sustainability and Stakeholder Approach in Olivetti from 1943 to 1960: A Lesson from the Past," *Sinergie Italian Journal of Management* 33, April 29, 2015, 19–36.

Again, defining Adriano Olivetti as "a man ahead of his time" is quite an overstatement, and can have a de-politicizing effect. The Olivetti family's commitment to workers' welfare was unusual, but not unique. Firstly, as this commitment was informed by the family's socialist sympathies, it would be more correct to speak of "coherence" than exceptionalism. Not mentioning this aspect fosters de-politicization because it invisibilizes the Olivettis' explicitly political background. Secondly, the idea that enterprises should positively contribute to society was shared by other entrepreneurs, engineers, and civil servants.[338] Ignoring this is also de-politicization because Adriano is pictured as an enlightened but isolated individual, whereas he was actually part of a community. He was not a "visionary utopian," but one of many entrepreneurs and engineers with a different political vision of working relationships and workers' welfare.

These two variations on the "man ahead of his time" portrait do not show whether Olivetti established Technopolitical Resonance through the Principle of Hopeful Curiosity. The "businessman ahead of his time" portrait does not specify whether the way Adriano made or envisioned computers was inherently new or different from US computer vendors: what matters here is that he invested in computers at a time when nobody else in Italy was doing that. In this case, Olivetti's Scientific Curiosity is attested, but we don't know about the "hopeful" component in the Principle of Hopeful Curiosity. Conversely, the "master ahead of his time" portrait does not discuss the specific significance of technology in the Olivetti's working relationships: this could hint at the Principle of Hope, but there is no mention of Scientific Curiosity.

The third variation on Adriano's perceived historical exceptionalism relates to his engagement with the cultural sector and the arts. This portrait shows the Principle of Hopeful Curiosity, making Adriano Olivetti an example of how to view computers differently than suggested by the Black Box Entanglement. This was also a powerfully re-politicizing discourse. Whereas the popular depiction of US computer manufacturers was tied to the military-industrial complex, Olivetti's legacy evoked a completely different cultural setting. Interestingly, Adriano's cultural commitment was not just presented as denoting "a man ahead of his time" but, in a way, also "a man behind his time." In fact, Adriano Olivetti was often compared to Italian Renaissance patrons and his interest in non-technical culture was likened to Renaissance Humanism.[339]

338 *Gallino, L'impresa Responsabile*, 9. See also: Matthew Wisnioski, *Engineers for Change: Competing Visions of Technology in 1960s America* (MIT Press, 2012).

339 Altiero Spinelli notably made this comparison after Adriano's death. See: *Adriano Olivetti. L'impresa, La Comunità e Il Territorio*, Collana Intangibili (Fondazione Adriano Olivetti, 2015).

Although science and technology played an important role in Adriano Olivetti's political vision, he did not have a deterministic understanding of history. On the contrary, he combined his interest in technological innovation with a commitment to humanistic culture. The name he chose for his first computer exemplifies this duplicitous interest. "ELEA" could be read as an acronym for "Elaboratore Elettronico Automatico"[340] (Electronic automatic computer), but was also a reference to the Ancient Greek Eleatic school of philosophy.

According to Adriano Olivetti, culture was "a disinterested search for beauty and truth."[341] His cultural interests were many, starting with design, architecture, and urban planning: Olivetti products, as well as factories, were famous for their aesthetic qualities. Renowned designer and architect Ettore Sottsass curated the design for ELEA 9003 and other Olivetti products, which often won the "Compasso d'Oro" (Golden Compass), a highly prestigious Italian design prize. In 2018, UNESCO declared Ivrea, Olivetti's company town, a World Heritage site.[342]

Adriano Olivetti not only *promoted* culture in Italy but also *changed* it, in the sense that he helped to diffuse new intellectual ideas, research interests, and design approaches. This commitment powerfully stressed the centrality of both "scientific" and "humanistic" aspects in his thought, in line with Bloch's Principle of Hope. In 1946, Adriano Olivetti founded the publishing company "Edizioni di Comunità" (Community Press) which is still active today. Edizioni di Comunità brought key thinkers on the social and political aspects of technological development to the Italian public. It was notably the first to publish Lewis Mumford in Italian[343] and one of the first to publish Schumpeter.[344] Another key cultural initiative was the Adriano Olivetti Foundation (Fondazione Adriano Olivetti), established after his death by the Olivetti family to preserve Adriano's cultural legacy. The foundation organizes cultural initiatives on societal, political, and technological themes.[345]

Adriano Olivetti's interest in non-technical culture was also reflected in his personnel management practices. When hiring engineers, he would ask them more about their cultural and reading interests

340 In an earlier version, the last word was "aritmetico."
341 From "L'Ordine Politico delle Comunità" (1946), quoted in Leonello Tronti, "L'idea di cultura in Adriano Olivetti. Valore e attualità di un'esperienza intellettuale e imprenditoriale," *Economia & Lavoro* 48, no. 2 (2014): 171–90.
342 https://whc.unesco.org/en/list/1538/, accessed September 20, 2022.
343 *La cultura delle città* (1953); *La condizione dell'uomo* (1957); *In nome della ragione* (1959), and others.
344 *Capitalismo, socialismo e democrazia* (1955).
345 In the 1970s the Foundation also acquired "Edizioni di Comunità."

than their technical skills and qualifications.[346] He also notably hired several intellectuals. Sociologists Gallino and Ferrarotti are two famous examples, as was the designer Sottsass. His human resources director was Ottiero Ottieri, a writer and sociologist. Left-wing intellectuals such as journalist Furio Colombo as well as writers Paolo Volponi and Franco Fortini, worked in the company's human resources and marketing departments. Anarchist intellectuals Ugo Fedeli and Carlo Doglio were respectively a librarian and a cultural organizer at Olivetti's Ivrea factory, and editor and translator for Edizioni di Comunità and the related magazine *Comunità*.

Furthermore, Adriano's Scientific Curiosity went beyond the computer sector: he also set up the first sociological research center in an Italian company, which was an important step in the development of Italian sociology.[347] Edizioni di Comunità fostered the publication of many fundamental books on sociology, including research conducted by Olivetti sociologists and the translation of classic works by international authors such as Durkheim and Weber.[348] In 1962, the first Italian faculty of Sociology was established in Trento (Istituto Universitario Superiore di Scienze Sociali), at the initiative of local Christian Democracy politician Bruno Kessler. One of Adriano's closest collaborators, Franco Ferrarotti, became dean of the faculty.[349]

Overall, this final resonant portrait of Adriano Olivetti as a "man ahead of his time" did have a significant impact on the re-politicization of computer debates, from both a macro and micro-political perspective. Adriano Olivetti became an example of how computers could be envisioned and designed in a non-military setting, inspired not by Cold War rivalry but "humanistic" values. He had demonstrated the possibility to envision and to practice a different macro and micro-politics of computing. This was not the "socialist use of machines" as Panzieri intended, but certainly a step towards it. Many of the intellectuals, engineers, and other Olivetti employees with a socialist background would play a role in re-politicizing computer debates within Italian socialism, as we will see in the next section.

346 The rationale was that prospective engineers had a degree, therefore were professionally competent. Listen to Giancarlo Lunati in the documentary "Idea Olivetti" by the National Archive of Corporate Cinema (Archivio Nazionale Cinema d'Impresa). Available at: https://www.youtube.com/watch?v=HW_dlxTLGIQ, accessed September 20, 2022.
347 Andrea Cossu and Matteo Bortolini, *Italian Sociology, 1945–2010: An Intellectual and Institutional Profile* (Springer, 2017), 37-39.
348 Cossu and Bortolini, 37-39.
349 Cossu and Bortolini, 71.

2.3 Between the "Old Left" and the "New Left." Early socialist challenges to the Black Box Entanglement

From the second half of the 1960, a wave of grassroots protests emerged in Italy. Like elsewhere in Europe, this wave stemmed from the Berkeley Free Speech Movement and US Counterculture, but also had specific local elements.[350] The Italian student movement soon established close ties with workers movements, thereby fusing two sets of crucial political actors. Until the early 1970s, the "new" movements remained relatively close to the "old" parties and labor unions. Although the internal quarrels and reciprocal criticism of the left were sometimes very harsh, the conflict was still based on a common language and political symbols. The scope for discussion and potential Technopolitical Resonance was thus maintained between the different generations and ideological strains of the local socialist culture.

This new wave of political participation led to the establishment of a wide array of new political groups in Italy. Many of these were short lived, and some interconnections might seem merely anecdotal if viewed individually. But the perspectives and the people who created them show that these interconnections were historically stimulated by, or resulted from Olivetti's humanism, Malatesta's voluntarism, and Gramsci's historicism. Together, they draw a resonant map of technopolitical feeling-thought that amplified the Principle of Hopeful Curiosity in public debates on technology design and use.

The transnational "cultural turn" of Marxism and the "libertarian turn" of the "New Left" which informed 1960s protests were not exactly "turns" in the history of Italian socialism. On the contrary, these were fundamental perspectives from the Italian "Old Left," which suddenly became popular also on a global level. The input of these international "turns" in socialist theories and practices, together with the local "canonization" of Malatesta and Gramsci, fostered a re-politicization of technology debates within Italian socialism. In this lively cultural and political sphere, Adriano Olivetti's legacy played a role, through the involvement of former Olivetti employees in these debates, and through the work of the cultural institutions that Adriano Olivetti had founded or helped to found.

350 Donatella Della Porta, *Movimenti Collettivi e Sistema Politico in Italia: 1960-1995* (Roma: Laterza, 1996); Alberto De Bernardi and Marcello Flores, *Il Sessantotto* (Il Mulino, 2003); Ginsborg, *A History of Contemporary Italy*; Wright, *Storming Heaven*.

The wider re-politicization of technology debates in this period was crucial for the long term, because it later helped to weaken the Black Box Entanglement, therefore fostering a re-politicization of specific "computer" technology. However, as I discuss throughout this dissertation, re-politicization did not happen in a linear way. The resonant interconnections soon suffered glitches amid Italy's increasingly tense political scene in the 1970s.

2.3.1 Olivetti, Malatesta, and Gramsci in the 1960s: Towards a "socialist use" of computers

The city of Milan was a key site for resonant interconnections in 1960s Italy. There, three local interpretations emerged of existing North American and European left-libertarian movements: Dutch Provos, US/UK hippies and beats, and French Situationism.[351] These groups were interested in technological devices, particularly for communication. In fact, their very existence and influence largely relied on their ability to create independent and autonomous sources of information, especially since the "mainstream" press was not giving them space. These experiments are important because they exemplify a "socialist use of technology": they were early steps towards countering the Black Box Entanglement and encouraged the later re-politicization of both the micro and the macro-politics of computing.

The Milan-based groups stirring the new libertarian youth were contiguous and the same people were often part of several collectives. Many initially gravitated around the anarchist circle "Sacco and Vanzetti," founded in 1965 by railway worker Giuseppe Pinelli and other Milan-based anarchists. Pinelli was also the mimeograph machine expert in the Sacco and Vanzetti circle. The machine is a key example of communication technologies used for political means in post-WWII libertarian movements. The mimeograph, or stencil duplicator, was an important technology because it allowed a political message to be shared quickly among a large number of people, reproducing written text without having to go through institutional communication channels. The same function would also be central in the later political use of the radio, then the computer: using computers as communication devices was an important factor in challenging the Black Box Entanglement, because it motivated actual engagement with the technology at a material level, finding ways to break the black-box and adapt it to new uses.[352] The use of the mimeograph was thus an early step towards re-politicizing computers at a micro-political level.

351 On late-1960s Italian countercultures, see: Silvia Casilio, "Controcultura e Politica Nel Sessantotto Italiano. Una Generazione Di Cosmopoliti Senza Radici," *Storicamente* 5 (2009).

352 On the political significance of computers as communication devices in Italy see: Alessandra Renzi, *Hacked Transmissions: Technology and Connective Activism in Italy* (University of Minnesota Press, 2020).

One of the pioneering publications linked to beat and hippy culture, *Mondo Beat*,[353] was first printed in the Sacco and Vanzetti circle. Technology was not a central theme in this short-lived publication, but the editors were interested in the creative use of printing technologies. *Mondo Beat* experimented with color printing and creative composition, showing that even a relatively simple machine like a mimeograph could be repurposed in multiple ways.

Mondo Beat and its grassroots beat culture had a more institutional counterpart, centered around Fernanda Pivano, author and translator, and her husband Ettore Sottsass, the Olivetti designer. The couple's relationship with grassroots beat culture was at times conflictual, as the youth sometimes accused Pivano and Sottsass of trying to "appropriate" their political stance.[354] Yet, the couple Pivano-Sottsass played an important role by popularizing beat culture in larger intellectual circles, and were directly responsible for enabling Italian translations of beat authors. Pivano fostered the circulation of authors like Allen Ginsberg, whose work she translated into Italian, and William Borroughs. Pivano and Sottsass also edited the short-lived magazine *Pianeta Fresco* on beat literature. In this way, Pivano and Sottsass maintained a communication channel where Technopolitical Resonance could be established between different societal and political groups.

Another crucial figure bridging "grassroots" and "institutional" cultural production was the publisher Giangiacomo Feltrinelli. Heir of an aristocratic and wealthy family, he joined the anti-fascist resistance and became a fervent socialist. Feltrinelli offered to publish and distribute the final issue of *Mondo Beat*. Under a pseudonym, he also authored the editorial, which caused consternation in the original editorial group. Feltrinelli was more deeply and personally engaged in the political aspects of grassroots culture than Pivano and Sottsass. In the 1950s he had established the (still active) publishing house "Giangiacomo Feltrinelli Editore," which was fundamental for the circulation of many radical left-wing political works by Italian and international authors. This continued after Giangiacomo's death in 1972 (see chapter 3). In the 1970s, Feltrinelli Editore published an important book series on "Science and Power," containing fundamental texts on Italian critique of the Black-Box Entanglement and the re-politicization of computer debates.

353 Another popular beat group "Onda Verde" worked with "Mondo Beat." Together they founded the magazine Urlo Beat and later Re Nudo, a longer-lasting magazine for beat and hippy countercultures, and a major Italian "underground" publication of the 1970s.

354 See: Andrea Valcarenghi, *Underground: A Pugno Chiuso!* (NdA Press, 2007).

Whereas the Italian Beats and Hippies mostly experimented with the creative use of communication technologies at the micro-political level, the Provos significantly addressed technology at the macro-political level. The Dutch Provo begun as a youth anarchist movement, which (among other things) harshly criticized the capitalist and consumerist high-technology society in which they lived.[355] Similarly, the Italian Provo movement mostly consisted of young people. Although small and short-lived, this movement is interesting because it combined a new libertarian movement with classic Italian anarchism. Its first bulletin in 1966, *Bollettino Provo*, also printed with Giuseppe Pinelli in the Sacco and Vanzetti circle, published a list of unsigned "libertarian principles" to strive for. This was nothing less than Malatesta's anarchist program, including of course the call to declare: "War to religion and to all the lies, even if they hide under the guise of science. Scientific education for everyone, up to the higher levels."[356] By doing so, the young Italian Provos were performing the same regulating emotional practice as Malatesta, thus establishing Technopolitical Resonance with him, based on the Principle of Hopeful Curiosity. Furthermore, by mobilizing Malatesta's technopolitical feeling-thought, they also extended their validity to the Computer Age: the "lies hidden under the guise of science" now also included the macro-political promises of the Black Box Entanglement.

Another short-lived yet important literary magazine was *Quindici*, edited by the neo-vanguard literary group, Group 63 (Gruppo 63). The magazine discussed themes related to politics, culture, and society. *Quindici* acted as a bridge between the more traditional, PCI-centered Italian Marxist culture, and the emerging Workerism and Autonomist Marxism, thereby creating another potential channel of Technopolitical Resonance between diverse socialist actors. The magazine advertised Marxist literature classics published by Editori Riuniti, the official PCI publisher, but also Latin American revolutionaries' works published by Feltrinelli, and communications from Workerist group Workers' Power (Potere Operaio). Many famous or soon-to-be-famous intellectuals wrote for the magazine: Furio Colombo, journalist and cultural organizer at Olivetti; Umberto Eco, "father" of Italian semiotics; Nanni Balestrini, writer and intellectual close to grassroots social movements. The magazine also featured contributions on technology. For example Giovan Battista Zorzoli, who was responsible for the PCI's energy programs; and Franco Piperno, one of the founders of Workers' Power. Their articles typically addressed technological development from a political

355 On the relationship between technology and the Dutch Provo movement: Dick van Lente, "Huizinga's children: Play and technology in twentieth century Dutch cultural criticism (from the 1930s to the 1960s)." *Icon* (2013): 52-74.

356 "Guerra alle religioni ed a tutte le menzogne, anche se si nascondono sotto il manto della scienza. Istruzione scientifica per tutti e fino ai suoi gradi piú elevati." *Bollettino Provo* 1, p. 9 (Archivio Giuseppe Pinelli).

standpoint, focusing on the potential rather than the downside of technological development, amplifying the Principle of Hopeful Curiosity's Technopolitical Resonance.

In 1967, *Quindici* published two issues in partnership with *S*, a situationist youth magazine. The Italian situationists commented in the pamphlet "On the poverty of Student Life"[357] by University of Strasbourg situationists, presenting their own ideas through a thematic series. The last one "The relationship between situationism and technology," exemplifies how the Principle of Hopeful Curiosity challenged the promises of the Black Box Entanglement on both the macro and the micro-political level. The *S* contributors stressed three points: first, they were against ideologies, including the old Marxist terminology that the Strasbourg group used; second, they wanted to overcome the "myth of the factory worker" as the most exploited subject and therefore the ideal vanguard for the revolution; third, they claimed that the only way to end the "myth of work" and "factory worker" was through technology. The Italian situationists stressed the mismatch between the promise of a (capitalist) high-tech society and its typical lack of knowledge sharing. In other words, they challenged the Black Box Entanglement. And they did so by mobilizing the Principle of Hopeful Curiosity in their discourse, following in the footsteps of Errico Malatesta and his 5th anarchist principle (increase scientific education to debunk science myths): "We will have […] to intensify the 'technological' component of our culture, so that its obvious deficiencies will intensify the contradictions between the awareness required to maintain a highly technological society (educate the kids!), and the underlying state of ignorance in which they would like to keep people."[358] Therefore, to break the Black Box Entanglement, it was necessary to improve scientific and technical education. The way to do this was to appropriate then teach children all the new technologies, for example cybernetics. Technologies could thus be used to counter "rigid ideologies, the more or less perennial 'values,' and the tales of Little Red Riding Hood or Baby Jesus."[359]

Together, the Italian Beat-Provo-Situationist movements represent a crucial example of the Principle of Hopeful Curiosity countering the Black Box Entanglement, establishing Technopolitical Resonance between different political actors, and different generations of Italian socialism. On the one hand, the Provos and Situationists performed the same mobilizing and

357 Internationale Situationiste, "De La Misère En Milieu Étudiant Considérée Sous Ses Aspects Économique, Politique, Psychologique, Sexuel et Notamment Intellectuel et de Quelques Moyens Pour y Remédier," (1966).

358 "Si tratterá anzi di intensificare (come ipotesi di lavoro) il carattere 'tecnologico' delle nostre culture, lasciando che le ovvie carenze intensifichino le contraddizioni tra la consapevolezza che si richiede per mantenere una societá altamente tecnologica (istruite i fanciulli!), e l'ignoranza di fondo in cui si vorrebbe mantenere la gente", "Il Situazionismo in Rapporto Con La Tecnologia," *S*, 1967, 4.

359 "contro le ideologie stantie, i 'valori' piú o meno perenni, le favole di Cappuccetto Rosso e di Gesú Bambino" "Il Situazionismo in Rapporto Con La Tecnologia," *S*, 4.

regulating emotions as Malatesta, reinforcing the idea that more scientific and technological education was needed to avoid succumbing to the misuse of science and technology. On the other hand, the beats and hippies, despite not openly engaging with technology issues, were pioneers in the political and creative use of communication technologies.

In this period, debates on science and technology were gaining momentum in Italian Marxism, fostered by two critical perspectives which emerged in the 1960s. These perspectives radically questioned the desirability of the Black Box Entanglement's promise of a technologically advanced capitalist society. But they also challenged the Soviet-inspired, deterministic macro-political discourse which prevailed within the Italian left, particularly the PCI.

The first critical perspective was the shift in the organization of work brought about by technological innovations, and relates to the emergence of Workerism I addressed in the "Padrone Olivetti" section. By the late 1960s, political movements stimulated by Workerist theories (that also sought to develop them) emerged, such as Workers' Power (Potere Opeario) and Continuous Struggle (Lotta Continua). The contrast between a "capitalist use of machines" and a "socialist use of machines" that Raniero Panzieri made in 1961 remained a crucial reference. The macro-politics of the Black Box Entanglement obviously fell into the first category, given that the negative consequences of increased workplace automation became a key theme of analysis in Workerism.

But Workerist movements were not strictly confined to factory workers. Many of the well-known Workerist activists actually started their political commitment as students: as mentioned, the Italian context featured an unusual convergence between workers and student movements. Beside the large and famous cities such as Milan, Rome, Turin or Bologna, a relevant site for emerging student-worker movements was Trento. In the mid-1960s, the University of Trento had become one of the first Italian universities where a student movement, openly inspired by the Berkeley Free Speech Movement, emerged. This happened in the recently established Sociology Faculty, where key future protagonists of Italian grassroots socialist movements were studying. "We were directly connected to Berkeley, and in sync with the anger of the Californian students," recalled Renato Curcio, an animator of the student protests.[360] The earliest famous student protest at the University of Trento, which led to the building's first "occupation," was linked to the request for institutional recognition of the "sociology" faculty not being a more generic "political science" faculty. This not-so-radical

360 "eravamo direttamente collegati a Berkeley e in sintonia con la rabbia degli studenti californiani" Renato Curcio and Mario Scialoja, *A Viso Aperto* (Mondadori, 1993). 26.

protest was actually the tip of the iceberg for a wider collective elaboration on the significance and role of the University as an institution.

In 1967 a document circulated in Trento, "Manifesto per un'universita negativa" (Manifesto for a negative university). Initiated by Renato Curcio and Mauro Rostagno then written collectively,[361] the manifesto claimed that the contemporary university essentially fed a "technological apparatus," described as the current equivalent of the former "Terror," and thus served to banish critical voices from society. This discourse established Technopolitical Resonance with the Berkeley students and their critique of the Black Box entanglement's macro-politics. However, the influence of Workerist theory was also important. The manifesto also mobilized the Principle of Hopeful Curiosity, by claiming that "to the capitalist use of science, it is necessary to oppose a socialist use of the most advanced techniques and methods."[362]

Another perspective influencing Marxist science and technology debates in Italy was the criticism of the non-neutrality of science. A key figure was Marcello Cini, one of the founders of the small but influential political group and newspaper *il manifesto*, born out of an Italian Communist Party split to the left.[363] Cini was a physicist by profession, with a great interest in the history of science and in the social implications of scientific and technological development. Cini's "institutional counterpart" was Giovanni Berlinguer, professor of social medicine and PCI Central Committee member (and brother of PCI secretary, Enrico). Marcello Cini and Giovanni Berlinguer were both prolific science communicators. They sometimes presented openly conflicting perspectives, but ultimately there was Technopolitical Resonance between them, based on the Principle of Hopeful Curiosity and stemming from a Gramscian historicist perspective on technological development discussed in chapter 4.

Critique of the neutrality of science extended to critique about the neutrality of medicine. This critique also stemmed from the 1968/69 workers movements, especially from the need for independent evaluations of industrial workers' healthcare and health hazards. Giovanni Berlinguer

361 Nanni Balestrini and Primo Moroni. *L'orda d'oro: 1968-1977: La Grande Ondata Rivoluzionaria e Creativa, Politica Ed Esistenziale*. Feltrinelli Editore, 1997.

362 "Ad un uso capitalistico della scienza bisogna opporre un uso socialista delle tecniche e dei metodi piú avanzati." "Manifesto per Un'Università Negativa," 1967.

363 Il manifesto was established in June 1969 by "leftist" members of the PCI who were particularly critical of the Soviet Union. In November, the PCI expelled this "il manifesto" group for openly criticizing the 1968 Soviet invasion of Czechoslovakia. The leader of the remaining PCI leftist members, Pietro Ingrao, stayed close to the "il manifesto" group. Having started as a monthly review, in the ensuing years *il manifesto* became one of the most illustrious and respected independent communist publications. From 1971, it was a daily newspaper.

contributed to this line of debate. Another important personality in this field was medical researcher Giulio Alfredo Maccacaro, founder of the organization Democratic Medicine (Medicina Democratica), and later co-editor with Marcello Cini of the Feltrinelli book series “Science and Power.”

Maccacaro also played a significant role as editor-in-chief for the magazine *Sapere*, one of the few scientific magazines for the general public. *Sapere* was founded in 1935 by editor Ulrico Hoepli. In 1962 it was bought by Olivetti’s Edizioni di Comunità, but sold again in 1968 following an economic restructuring. The magazine passed to publishers Dedalo, that also published the independent communist newspaper *il manifesto*. From this period *Sapere* took a distinctly leftist turn, particularly from 1974, when its editorial committee was managed by Maccacaro and Giovanni Cesareo, a journalist with the PCI newspaper *l’Unitá*. Marcello Cini was also part of the editorial committee. Under this new direction, the magazine published many articles and reports focusing on the societal and political implications of scientific and technological development. In this period, the magazine *Sapere* became another open channel that could foster Technopolitical Resonance between different political subjects. It presented radical perspectives, but in a more institutional medium that could convey them to a wider public than grassroots activists.

The second half of the 1960s saw rising generational and ideological conflicts, yet this was a very productive period for the Technopolitical Resonance of the Principle of Hopeful Curiosity and the criticism of the Black Box Entanglement. The political left was growing ever stronger in Italy: from the students-workers movements to the Italian Communist Party, every group increased their political consensus. This became particularly evident after the so-called “Hot Autumn,” a period of intense workers protests peaking in the Autumn of 1969. Criticism of the “capitalist use of technology” and the “non-neutrality of science” was crucial among workers, students, and intellectuals. But so was the call for better scientific and technological education, from all sides of the socialist political spectrum. The Technopolitical Resonance of the Principle of Hopeful Curiosity was thus being amplified through interconnected relationships and debates. The resulting resonance formed a powerful counterpoint to the Black Box Entanglement, and a widespread socialist re-politicization of both the macro and the micro-politics of computing seemed imminent.

Until everything changed. On December 12, 1969, a blast was heard in Milan: a bomb had exploded in the National Agriculture Bank at Piazza Fontana (Fontana Square). By the time the dust settled

and the rescue services left, the headcount was dramatic: 17 people dead, and 88 injured.[364] The "Piazza Fontana massacre" symbolically marked the advent of a period of increased political violence and mistrust. At first, leftist social movements, particularly the anarchists, were accused of the bombings. But they strongly denied their involvement, and over time it became increasingly clear that the attack was actually linked to neo-fascist groups.

Many leftist circles perceived the bombing of Piazza Fontana as a conservative reaction to the new freedoms that the workers movements were demanding and enjoying. This perception was fueled by the death of Giuseppe Pinelli, Sacco and Vanzetti circle founder and mimeograph expert. After the explosion, he was one of several "suspects" brought in for questioning by the police. Pinelli was detained and questioned for more than 48 hours, the legal limit. On the morning of December 15, he allegedly "fell" to his death from the window of the fourth-floor interrogation room. The police denied any responsibility, claiming that Pinelli committed suicide. This declaration, along with the many discrepancies in the police report, sparked outrage. Many pointed out that Pinelli's death was neither a suicide nor an accident, but a murder by the State, as was the Piazza Fontana bombing.[365] The unjust prosecution of anarchists underlined that Pinelli's "accidental"[366] death was merely the final step in a massive State cover-up of the massacre:[367] "La strage di Stato" (The State massacre) was a popular description of these events.

The events of December 1969 strongly distanced the grassroots left from the institutional left embodied by the PCI and labor unions. Some, like Giangiacomo Feltrinelli and Renato Curcio, eventually turned to the organization of an armed "resistance." This distancing had mixed outcomes in terms of reactions to the Black Box Entanglement. On the one hand, it fostered an interest in independent information, because "official" communication channels were deemed unreliable. This interest was fundamental for the re-politicization of computers, as I discuss in chapter 5. On the other hand, the resonant interconnections established in previous years lost their strength. In some instances, increasing mistrust of the State and its institutions fueled an ambivalent narrative which strongly opposed US capitalism, but ultimately reinforced the Black Box Entanglement by

364 Thirteen of those injured later died. On the same day, three more bombs exploded in Rome, wounding 16 people, and another device (which did not detonate) was found in Milan.

365 Later, in the official investigation on Pinelli's death, the Italian justice ruling was that he died of "un malore attivo," "an active illness." This was a very odd formulation: it implied that the police had some responsibility but also that Pinelli died because *he* fell. John Foot states: "this version satisfied nobody and has been the object of ridicule ever since," in "The Death of Giuseppe Pinelli: Truth, Representation, Memory." *Assassinations and Murder in Modern Italy*, 59–71. Springer, 2007, 61.

366 From a popular literary account of the events, *Morte accidentale di un anarchico*, by Dario Fo.

367 Pinelli and the anarchists had to wait until the late 1970s to have their names cleared in judicial procedures, and the trial attributing the bombing to neofascist group "Ordine Nuovo" was only officially closed in 2005.

presenting computers and their “capitalist” ideology as unavoidable. In other cases, the conflict between the Principle of Hopeful Curiosity and the Black Box Entanglement initially favored the former, but computer debates were eventually “normalized” according to the aspiration and promises of the Black Box Entanglement.

But the most significant fact for Technopolitical Resonance is that science and technology were only marginally addressed by grassroots political movements for most of the 1970s. And the distancing from the PCI and labor unions, which were then more receptive to debates on technological development, did not help fill this gap. Yet some traces of the 1960s remained: the Technopolitical Resonance of the Principle of Hopeful Curiosity kept on sounding, quieter but still audible.

2.3.2 Social rationality questioning technocratic utopia. Towards a “credible” use of computers

In 1971, the Adriano Olivetti Foundation held an international seminar on the societal and political implications of developing and diffusing computers. The conference proceedings were later published under the title “Razionalità Sociale e Tecnologie Della Informazione” (Social Rationality and Information Technologies).[368] The conference represented a unique moment of exchange between an international and interdisciplinary group of experts, discussing both the macro and the micro-politics of computing. The participants were mostly from Western Europe, North America, and Israel. Many prominent personalities in Italy’s history of computing attended.[369] Most of the participants worked in academia or research institutes, particularly in the fields of social sciences, law, and economy. A much smaller group worked in the computer industry, also at Olivetti. Some politicians were also present. Most of the papers were authored by social scientists, and particularly sociologists. The themes for discussion were many, including systems theory and cybernetics; the use of computers in national and local public administration; the role of IT in the changing labor market; the economic and organizational implications of new technologies.

368 Centro Studi della Fondazione Adriano Olivetti, *Razionalità Sociale e Tecnologie Della Informazione*, 3 vols. (Edizioni di Comunità, 1973).

369 Notable participants were Luciano Gallino, already introduced here; Stefano Rodotá, professor of civic law and PCI member, who became a key political figure in creating Italian digital privacy laws; Mario G. Losano, also a professor of law who frequently participated in PCI conferences on computers; Luigi Dadda, professor of electrotechnics and one of the pioneers introducing Computer Sciences in Italian academia; Giovanni Billia, director of INPS electronic services. Centro Studi della Fondazione Adriano Olivetti, *Razionalità Sociale e Tecnologie Della Informazione*, vol 1.

The seminar was conceived from an explicit anti-deterministic perspective, as explained in the introduction to the conference proceedings. Contemporary political discourses tended to look at scientific and technological development as something "automatic" which worked independently from society. The introduction pointed out how this perspective was shared by two opposing ideologies: technocratic, and those contesting technocracy. The seminar aimed to go further, by looking at the mutual shaping of technological and sociopolitical systems. For this reason, the seminar organizers included themes and authors that were "not compromised by technocratic prejudice."[370]

In this sense, the conference was a crucial moment for the criticism of the Black Box Entanglement and the re-politicization of Italian computer debates. The analysis of "anti-technology" and "anti-science" attitudes in youth social movements, in other words the Counterculture's computerphobia, was a key theme, discussed in dedicated contributions by renowned social scientists. These contributions are particularly interesting because they completely reverted the emotional practices based on the Black Box Entanglement. As discussed in chapter 1, research on computer attitudes, anxiety, addiction, and phobia (CAP) marginalized Counterculture's criticism by performing a regulating emotional practice which medicalized the criticism of technology. Conversely, the Olivetti conference participants actively engaged with the Counterculture's arguments, trying to trace their wider historical and sociological meaning. This often led to the conclusion that most of the Counterculture's critique was sound and justified, to the point that some authors explicitly agreed. In this way, they performed a regulating emotional practice which reverted the norm established by the Black Box Entanglement, and fostered a re-politicization of computer debates on the macro-political level. I argue that this alternative regulating emotional practice also amplified the Technopolitical Resonance of the Principle of Hopeful Curiosity.

The issue of "anti-technology" attitudes in left-wing political movements was addressed in an essay by Anatol Rapoport. Rapoport was a mathematician and systems theory expert, founder of the International Society for Systems Sciences and vocal anti-war activist. In his piece, he discussed how and why science and technology acquired such a negative connotation, especially for younger generations. According to Rapoport, science and technology's "bad reputation" was mostly due to the progressive quantification of society through the promises of scientific "objectivity" and the

370 Sergio Ristuccia, "Un Difficile Discorso Politico," in *Razionalità Sociale e Tecnologie Della Informazione*, vol. 1, (Edizioni di Comunità, 1973), XIX–XL, XX.

idea that science could provide absolute truths.[371] Furthermore, he observed that many young people accused science of being "irrelevant," meaning that it was not relevant for their most essential human needs.

Rapoport addressed these issues by mobilizing the Principle of Hopeful Curiosity. According to him, contemporary technocratic societies had lost the "illuministic" function of science. In the past, science had brought people many visible benefits: it improved material living conditions, it functioned as a way to solve conflicts, it promised a future in which humanity would be united, and it provided new universal ethical ground. In other words, Scientific Curiosity was a very positive force of social change. However, science had lost this function: was it still relevant, Rapoport questioned, to seek techno-scientific solutions when the problems were caused by technological development in the first place? On the one hand, science was necessary to correctly frame societal problems and thus find appropriate solutions. But, on the other hand, science needed complementary institutions and sources of knowledge to address large scale issues. This was the same argument underlying the Principle of Hope, namely the need to combine "cold" and "warm" perspectives on sociopolitical questions. Yet, according to Rapoport, "those who are at the summit of decision centers do not realize that they are prisoners of antiquated structures of thought."[372] This made them incapable of directing science toward solving real societal problems: "Here is the origin of the mistrust of science which invades the souls of such a big part of the younger generations in the Western world. This is because even the potential of applied social sciences has caught the attention of power elites, and the means of processing information are rapidly incorporated in the techniques to manipulate and dominate the public."[373]

Some of the commentaries on his intervention were harsh. In particular, sociologist Tom Burns argued that Rapoport was misplacing the target of his accusations. Rapoport responded by fiercely exposing himself as a supporter of youth protests, mobilizing again the Principle of Hopeful Curiosity: "Although I am a pessimist, I shall behave as if I were an optimist, as if I had some hope

371 "When alienated youth reject a scientific vision, the cause should be sought not only in the abuse of technology under the stimulus of megalomania, but also in that kind of reasoning which passes as 'rational processing of decisions'" he claimed. "Quando i giovani alienati respingono la visione scientifica, la causa va ricercata non solo nell'abuso della tecnologia stimolata da megalomania, ma anche in quel tipo di ragionamento che passa per 'elaborazione razionale delle decisioni.' Anatol Rapoport, "Verità, Decisioni e Strategia," in *Razionalità Sociale e Tecnologie Della Informazione*, vol. 1, 3 vols. (Edizioni di Comunità, 1973), 121–62.

372 "Coloro che stanno al vertice dei centri decisionali non si rendono conto di essere prigionieri di antiquate strutture di pensiero." Rapoport, 157.

373 "Qui sta l'origine della sfiducia verso la scienza che oggi invade l'animo di tanta parte delle giovani generazioni del mondo occidentale. Giacché anche le potenzialitá della scienza sociale applicata hanno attirato l'attenzione delle elites del potere, e i mezzi dei processi d'informazione vengono rapidamente inseriti nelle techniche in uso per manipolare e dominare il pubblico." Rapoport, 157.

for the future of our species. Sometimes I see a light of hope in the categorical denial, by our children, of the values which created the nightmare we live in today."[374] Rapoport was thus encouraging "pessimism of the reason and optimism of the will," central in Bloch and Gramsci's theory, pointing at the libertarian youth as the most promising historical and political subjects that could counter the misuse of science and technology. This called for a powerful re-politicization of the macro-politics of computing: although technology was eminently associated with the military-industrial complex, it was not inescapable nor immutable.

The Principle of Hopeful Curiosity was also mobilized in sociologist Samuel Eisenstadt's essay, which framed young people's anti-technology attitudes as the outcome of a clash between different kinds of "rationalities." Similar clashes had always existed in the history of mankind, as Eisenstadt reasoned in his lengthy commentary on the notion of "rationality" in "traditional" and "contemporary" societies.[375] In contemporary Western societies, "experts" and specialized knowledge had become increasingly relevant, particularly in political and administrative arenas, and as a consequence of technological developments. At the same time, new protest movements were marked by a generalized skepticism towards both traditional political centers and the role of science, envisioned as the core of the new socio-political order. The Counterculture could be seen as driving a new shift in "rationality."

Even though Eisenstadt had a more detached and critical perspective than Rapoport, he also gave credit to the youth movements' arguments, and he weakened the Black Box Entanglement by mobilizing skepticism about its promises and desirability. He recognized that contemporary technological development could also lead to an increasing monopoly of information and specialized knowledge sources. This observation paved the way for a re-politicization of computing also on the micro-political level. Eisenstadt pointed out that both private and public organizations tended to "hide in secrecy their heritage of knowledge, in the name of 'professional' values which seem to be masking multiple interests and their increasing organizational conservatism."[376] Thus the "black boxed" design of many technologies was not an unavoidable choice: on the contrary, it stemmed from a specific strategy by the producing companies.

374 "Ma anche se sono un pessimista mi debbo comportare come se fossi un ottimista, come se nutrissi qualche speranza per il futuro della nostra specie. Qualche volta vedo un lume di speranza nel rifiuto categorico da parte dei nostri figli dei valori che hanno creato l'incubo nel quale viviamo oggi." Rapoport, 255.

375 This traditional/contemporary division was superficial and criticized by other participants.

376 "nascondere nella segretezza il loro patrimonio di conoscenza, in nome di valori 'professionali' che sembrano mascherare molteplici interessi e il loro crescente conservatorismo organizzativo" Samuel N. Eisenstadt, "Innovazioni e Tensioni Tra Diversi Tipi Di Razionalità," in *Razionalità Sociale e Tecnologie Della Informazione*, vol. 1, 3 vols. (Edizioni di Comunità, 1973), 258–314, 294.

During the commentary session, Harold Wilensky, an organizational sociologist at Berkeley, disagreed with Eisenstadt's framing the counterculture as bringing a new change in rationality. According to Wilensky, the Counterculture had undoubtedly been very effective in cultural and symbolic domains, but structural social change was a different thing, a much longer and complex process: "I remember how the IBM punched card was used with intelligent symbolism in Berkeley by the Free Speech Movement. We are again in the realm of culture, of symbolism; we are still far away from any action. And these social movements can disappear any day."[377] Wilensky's prophecy did come true to some extent, as the US Counterculture faded away in the 1970s. And, although Italian socialist movements remained strong in the 1970s, they also heavily reduced their shared engagement with science and technology debates.

Yet, the Olivetti conference is a crucial example of how discourses challenging the Black Box Entanglement remained central in Italy, not just at grassroot level "countercultural" politics, but also in more institutional settings. In 1973, Edizioni di Comunità published the conference proceedings, "Razionalitá sociale e Tecnologie dell'Informazione". The seminar's subheading, "Description and critique of the technocratic utopia," explicitly conveyed the very critical themes. The introduction, titled "A difficult political discourse," spoke about the key political challenges involving computers, which remained fundamental in the following decades. It was authored by Sergio Ristuccia, head of the Political Studies Group at the Adriano Olivetti Foundation. His introduction established Technopolitical Resonance with Rapoport and Eisenstadt (and Malatesta, Gramsci, Adriano Olivetti etc.), based on the Principle of Hopeful Curiosity. Rapoport and Eisenstadt's emotional practices can be seen as mobilizing, because they certainly came from authoritative figures, but were within a larger debate. Ristuccia's emotional practices, on the other hand, were also regulating, because he was drawing a conclusion from the debate. And this conclusion hinted that the Black Box Entanglement was an undesirable technopolitical feeling-thought, whereas the Principle of Hopeful Curiosity was a desirable one.

The criticism of the Black Box Entanglement played an important role in Ristuccia's argument. He linked anti-technology attitudes with two factors related to the computer's success:[378] first, the

377 "Io ricordo come la scheda IBM fosse usata con intelligente simbolismo a Berkeley dal Free Speech Movement. Siamo di nuovo nel regno della cultura, del simbolismo; siamo ancora lontani da qualsiasi azione. E questi movimenti sociali possono scomparire da un giorno all'altro," *Razionalità Sociale e Tecnologie Della Informazione*, vol 1, 324.

378 These success factors were identified in a report presented in 1970 to another conference on computers held by the Fondazione Agnelli, as reported in Ristuccia, "Un Difficile Discorso Politico," xxvi.

practice of renting computers, coupled with the computer vendors' cultural influence, gave the computer industry almost exclusive power in deciding when it was time to upgrade or change systems. This implies the micro-politics of the Black Box Entanglement, because it described a situation where knowledge about computer functioning was not accessible by those who used them. Second, Ristuccia observed how computer vendors reverted the classic principles of marketing: they did not interpret consumer demand, but created new demands which did not previously exist. This argument highlighted the macro-politics of the Black Box Entanglement, and the use of Fear of Falling Behind to promote computers. According to Ristuccia, computer vendors created a narrative which glorified computers beyond imagination, also tying them to exceptional examples of technological development such as spatial engineering. The Fear of Falling Behind was therefore an artificial emotion, crafted in order to sell more computers.

These two trends in computer development were, according to Ristuccia, the "objective motives" behind young people's anti-technology attitude, because "first of all, they underline how the historical objectives of the recent technological development excluded goals which were proportionate to the vital needs of the masses, both in terms of well-being and in terms of power."[379] Ristuccia was, however, also very critical that anti-technology standpoints often overlooked the actual functioning and materiality of the technology. Ristuccia was thus calling for a stronger re-politicization of the micro-politics of computing. In order to reduce the most destructive anti-technology standpoints while maintaining their macro-political critique, social factors had to be removed which prevented a "credible democratic use of technological innovation in the field of computing."[380]

This statement by Ristuccia poignantly describes why socialist computer debates weakened during the 1970s. With some exceptions, most socialist groups could not envision a "credible" socialist use of computers and so they were not a popular theme for discussion. One of the reasons for this loss of credibility is that in the 1970s, the equation "computer=IBM" became much more prevalent than "computer=Olivetti." Yet, even within IBM—or more specifically, the Italian branch of IBM—the Technopolitical Resonance of the Black Box Entanglement would be challenged, as I discuss in chapter 3. Furthermore, former Olivetti employees participated in socialist groups' computer debates. By doing this, they played a major role in further establishing Technopolitical Resonance

379 "esse sottolineano innanzitutto in quale ampia misura siano stati esclusi dagli obiettivi storici del recente sviluppo tecnologico finalitá proporzionate ad esigenze vitali delle masse sia in termini di benessere che in termini di potere" Ristuccia, xxx.
380 Ristuccia, xxxiii.

based on the Principle of Hopeful Curiosity, thus challenging the Black Box Entanglement within the political traditions of “democratic socialism” and “libertarian socialism.”

On the “democratic socialism” side, Olivetti-trained computer expert and member of the *Sapere* editorial group Paola Manacorda played an important role in re-politicizing computer debates.[381] Manacorda’s iconic essay in 1976 *Il Calcolatore del Capitale* (“The Capital’s Computer”) presented a Marxist analysis of information technologies and their political significance. Although highly critical, the book importantly fostered critique of the macro-political “capitalist use” of computers, including a deep understanding of the micro-political aspects. Manacorda became a renowned author on the societal and political implications of computing. Chapter 4 discusses in depth her work, particularly in connection with the PCI.

In 1970, a colleague and friend of Manacorda at Olivetti and member of the Italian anarchist movement, Antonio Scalorbi, together with Carlo Doglio, also a former Olivetti employee, joined in debates organized by the recently founded “Federated Anarchist Groups” (Gruppi Anarchici Federati, GAF). Scalorbi brought to the floor a critical but ultimately positive analysis of computers, advocating greater consideration of their potential within the anarchist movement. This call did not generate particular interest at the time, but as chapter 5 shows, the anarchist movement eventually promoted fundamental arguments and practices that countered the influence of the Black Box Entanglement in Italy.

381 Manacorda had a degree in mathematics, and at Olivetti expanded her knowledge of computers, later working as a computer expert in public administration.

2.4 Conclusion: before the Black Box Entanglement

The lasting legacy of Adriano Olivetti, Errico Malatesta, and Antonio Gramsci fundamentally influenced 20th century debates on scientific and technological development within Italian socialist circles. They shared the same technopolitical feeling-thoughts, which I call "the Principle of Hopeful Curiosity," stressing the centrality of human agency as well as the value of technological development in achieving a socialist society.

Although Adriano Olivetti was a controversial figure in socialist groups, who first and foremost saw him as the capitalist and paternalistic "Master Olivetti," his legacy shaped the re-politicization of Italian computer debates. His commitment to culture as a "disinterested act" was indeed noteworthy. Consequently, Adriano Olivetti hired a lively and diverse collection of bright, politicized intellectuals. Some would later promote political debates on technology, computers in particular, within their political circles. Adriano's persona was somehow rehabilitated after his death by the more institutional sections of the left, particularly the PCI, who argued that the sale of Olivetti's electronic division was a "missed opportunity," largely due to the incompetence of the ruling party, the Christian Democracy.

The Olivetti case provided a powerful counterargument to the threats and promises of the Black Box Entanglement. On a factual level, Italy was undoubtedly behind the USA in terms of computer production and adoption. But on a symbolic level, the Olivetti experience was "behind" no other: for example, in Italian popular narratives, the ELEA and Programma 101 were (and still are) frequently called the first transistorized computer and the first personal computer in history. An even more powerful motivation than the Fear of Falling Behind was the ambition to revive the "Golden Age" of Italian computing, when Olivetti engineers pioneered all kinds of computer inventions. Furthermore, this "Golden Age" was not just technological, but also social, cultural, and political: Adriano Olivetti was proof that computers could indeed be envisioned within a different framework than a US military lab or an IBM advertisement.

The presence of a man like Adriano Olivetti, however, would not have been so significant without the existence of a wider cultural and political milieu to establish some form of Technopolitical Resonance with his vision. From this perspective, the Italian context was interesting thanks to two socialism "founding fathers," Errico Malatesta and Antonio Gramsci, who both criticized deterministic perspectives on the role of science and technology, but also defended the importance

of scientific and technological knowledge in a socialist society. In other words, there was Technopolitical Resonance between them based on the Principle of Hopeful Curiosity. Their vision would inevitably conflict with the Black Box Entanglement promise of establishing a technologically advanced capitalist society. But it also escaped the opposing temptation, replacing "capitalism" with "socialism" while retaining a deterministic faith in the political significance of scientific and technological development.

In the second half of the 1960s, a wide and diverse network of relationships and debates united the many different souls stimulating Italian socialist culture. The powerfully interwoven legacies of Olivetti, Malatesta, and Gramsci generated a re-politicization of technology debates and uses, and the first explicit challenges to the Black Box Entanglement. From the creative use of the mimeograph machine, to the Workerist analysis on Marx's *Grundrisse*, technology came under close political scrutiny, in the quest for a "credible," "socialist use" of machines. In other words, the Principle of Hopeful Curiosity was being amplified, establishing a space for connection and understanding across multiple groups of actors.

The Technopolitical Resonance of the Principle of Hopeful Curiosity, however, was not continuous nor homogeneous within socialist groups. Interest in the political re-appropriation of technology halted in the 1970s, and until the end of that decade. In some cases, as with anarchists, the subject was just dropped. In other cases, as in some left-communist organizations, a quite strong rejection of "capitalist" science and technology prevailed. The emergence of IBM, not Olivetti, as the most relevant computer manufacturer operating in Italy, accompanied this process, as the following chapter reveals.

Chapter 3
Inside the Black Box Entanglement: IBM's contested role in Italy

The Americans are coming
Garibaldini *from Mars*
Holy Virgin, you listened to our prayers!
From their trucks, full of flowers and flags,
while we clap our hands
they throw us freedom chocolate bars

"The Americans are coming," Stormy Six, 1975[382]

"For me, IBM looked right away like a model life, a model company, with lots of clearly positive aspects,"[383] claimed IBM employee Giovanni Losi in an interview with *L'Erba Voglio* magazine,[384] for "The IBM Man" report (1971).[385] Over time, Losi felt more and more familiar with the company: "Something I experience often […] is, looking at the company as a positive figure. As if it was a kind of mom, a good mom… you can often hear people at IBM saying: mom IBM, mom IBM."[386] He pointed out that a job at IBM was particularly appealing for those in highly-skilled technical positions—the salary was generous and you were always up to date with the latest computer developments.

However, Losi's initial enthusiasm was later dampened by feelings of ambivalence. He explained that IBM pushed for a strict individualization of working relationships, aimed at strengthening the bond between managers and employees. But this structure reinforced existing hierarchies, and when actual problems arose, the workforce was usually powerless. Losi observed, "No-one feels entirely satisfied [at IBM], but a sort of mature reasoning is established: they accept this dissatisfaction out of respect for the principle of reality. 'This is reality. I can't totally adapt to this reality, but I am

382 "Arrivano gli americani // Garibaldini marziani // Vergine Santa hai sentito le nostre preghiere! // Dai camion, tra fiori e bandiere // Mentre battiamo le mani // Lanciano tavolette di libertà." The song's tone is ironic about the USA's role in the demise of fascism and reconstruction of Italy, mocking the idea that Americans were Italy's saviors. "Garibaldini" were followers of Giuseppe Garibaldi, hero of Italy's 19th century unification.

383 "L'IBM mi è parsa subito come la vita modello, la ditta modello, con molti aspetti nettamente positivi." "L'Uomo IBM," *L'Erba Voglio*, September 1971.

384 *L'Erba Voglio* was an independent editorial project close to the Feminist Movement and grassroots left, focusing on sociological, psychological, and educational themes. The magazine's title is untranslatable, referring to a popular Italian saying, "You can't always get what you want," although here it can mean the opposite.

385 "L'Uomo IBM," *L'Erba Voglio*, September 1971.

386 "C'è una cosa che è vissuta spesso anche da me. […] cioè vivere la ditta come figura positiva, come si dice, come se fosse una specie di mamma, una mamma buona… è un modo di dire che si sente spesso lí alla IBM: la mamma IBM, mamma IBM." "L'Uomo IBM." 5. "Mom IBM" was also heard at IBM Chile. Eden Medina, "Big Blue in the Bottomless Pit: The Early Years of IBM Chile," *IEEE Annals of the History of Computing* 30, no. 4 (2008): 26–41.

mature enough to accept it.' Every time a Company's action is questioned, something strange happens: instead of it going against the Company, instead of creating solidarity and unity in the workforce, a conflict arises between employees."[387]

Furthermore, Losi was becoming disillusioned with his job. He had envisioned that working with computers was creative, based on finding solutions to real problems. But in reality, he explained, technical choices at IBM always depended on a strict hierarchy, and most employees had very little room to maneuver. Years later, IBM labor unionists would be even more critical of this aspect, observing how "the downgrading of technological know-how in Italy is reaching alarming levels: [IBM] Hardware and Software products are increasingly sophisticated, and are increasingly like 'closed boxes' given to Italians just to use."[388]

The interview with Losi was followed by an editorial discussing the Adriano Olivetti Foundation conference on "Razionalità Sociale e Tecnologie dell'Informazione."[389] *L'Erba Voglio* commented that the debates ensuing the Olivetti conference created two poles: "technocratic security" versus "human worries" (or even "technicians' remorse," as the Italian Communist Party magazine *l'Unità* reported[390]). The editors claimed that something was still missing from the conversation: a reflection on who was actually producing the technology. They stressed that most computer companies were based in the USA, and a new international division of labor was emerging. As the IBM case demonstrated, fundamental research & development activities were centralized in the USA, while countries with a "weaker" capitalist system remained subordinate. Furthermore, this global reshaping of industrial relationships not only involved technology development: IBM also symbolized a new kind of rationality, that of the "computer-controlled society" increasingly influential across the world.

The IBM Man report shows how IBM amplified the Technopolitical Resonance of the Black Box Entanglement in Italy. Notions like "IBM rationality" and "IBM society" as I discuss here, were how Italian socialist groups experienced and referred to the Closed World. "IBM society" was the

387 "Nessuno si sente completamente soddisfatto, ma si stabilisce una specie di ragionamento adulto: si accetta questa specie di insoddisfazione come per rispetto al principio di realtá. La realtá è questa, io non riesco ad adattarmi totalmente a questa realtá, peró sono abbastanza adulto da accettarla. Cosí, tutte le volte che si mette in discussione qualcosa che è stato fatto dalla Societá, stranamente succede che invece di prendersela con la Societá, invece di creare una solidarietá, una unione, scoppia il contrasto tra i dipendenti." "L'Uomo IBM," 5.

388 "Lo scadimento di conoscenze tecnologiche in Italia sta raggiungendo valori allarmanti: i prodotti Hardware e Software, sempre piú sofisticati, sono sempre piú delle 'scatole chiuse' date solo in uso agli Italiani." *IBM: quale presenza oggi in Italia?*, March 1979 - IBM Italia RSU archive.

389 See chapter 2, section 2.3.2.

390 "L'Uomo IBM," 6.

Closed World, and "IBM rationality" was the means to achieve it. According to IBM Italia, if you did not embrace IBM rationality, you would fall behind IBM society. Conversely, the "IBM Man" could live happily ever after in IBM society. But IBM society was based on specific macro-politics: the Closed World goal of establishing a global, technologically advanced, capitalist society. The "IBM Man" report also addressed the micro-politics of IBM computer design, pointing out that the work at IBM Italia largely depended on what US higher management demanded and decided. Ultimately, embracing IBM rationality to achieve IBM society, meant a de-politicization of computer debates and design. It meant creating a generation of "IBM men" enthusiastic about computers though not able to influence their functioning.

At the same time, critical comments from an employee like Losi also show that not everyone at IBM was like "The IBM Man." From this perspective, IBM rationality was also a factor for re-politicization in Italian computer debates. IBM's presence in Italy also fostered emotional practices countering the Black Box Entanglement. *L'Erba Voglio* editors criticized that mainstream press computer debates usually focused on the future, questioning: what *will* future computer society look like? *Will* individual freedom survive this new society? The editors remarked that, as Losi had shown, this new society was already there. Their "IBM man" report also aimed to be "the start of a collective awareness and critique, the only guarantee for the overturn [of IBM rationality]."[391]

In this chapter, I investigate the de-politicization and re-politicization of Italian computer debates and design by looking at the emotional practices produced *by*, *within* and *about* IBM. This chapter introduces two more sets of emotions. The first set is "Working Class Pride" and "Class Hatred." Both emotions stem from the historical tradition of the workers movement, highlighting the conflict between the working class and the "masters." Whereas Working Class Pride emphasizes the achievements that could be obtained through uniting the workforce, Class Hatred stresses the masters' wrongdoings, and all those who side with them, who become "class enemies." Class Hatred thus frames the workers/master relationship as a conflict which can only be solved by destroying one of the two sides. The second set is the dichotomy between "Revolutionary Fear" and "Revolutionary Trust" that is mobilized through acts of political violence. Revolutionary Fear is the fear activated in an attack's targets, considered enemies of revolutionary forces. Revolutionary Trust is trust in the possibility of an armed revolution, mobilized for those seeking to carry out a revolution if an attack is successful.

391 "L'intervento registrato che pubblichiamo […] è anche l'inizio di una critica e di una consapevolezza di massa, unica promessa del suo rovesciamento." "L'Uomo IBM," 7.

I start with discussing the outreach activities conducted *by* IBM Italia, mainly its communication division. Fear of Falling Behind, the Principle of Hope, and Scientific Curiosity (but not the Principle of Hopeful Curiosity, as I shall explain) were mobilized through the company's communication and marketing practices. This parallel mobilization created debates between competing visions addressing the macro-politics of computing, thereby fostering a re-politicization on that level. In the second section, I present the criticism of the company raised *within* IBM Italia by its labor unions. Here, the Black Box Entanglement's Technopolitical Resonance was fiercely challenged, by mobilizing "Working Class Pride." Both the macro- and micro-politics of computing in IBM society were criticized. Section three discusses IBM's symbolic role in the genesis of "anti-technology,"[392] or "computerphobic,"[393] discourses and practices within the Italian left. I focus on the so-called "armed party," the leftist grassroots political groups using armed struggle as a political practice.[394] Their criticism of IBM rationality was close to that of the labor unions, particularly the most famous representative of the armed party: the Red Brigades (Brigate Rosse). However, "Class Hatred" dominated more than "Working Class Pride" in these groups' emotional practices. Despite harshly criticizing IBM and the US military-industrial complex, not all fostered re-politicization. While the macro-politics informing IBM rationality were analyzed, the micro-politics of computing were only tackled superficially. The Black Box Entanglement's grand claims were thus ultimately validated, de-politicizing computer debates and design.

392 As Sergio Ristuccia said at the Olivetti 1971 conference (chap 2).
393 How Behavioral Scientists describe it (see chap 1).
394 Giorgio Galli, *Storia Del Partito Armato 1968-1982* (Rizzoli, 1986).

3.1 IBM Italia and the Black Box Entanglement

IBM opened its first Italian branch in 1927, as the International Society of Commercial Machines (Società Internazionale Macchine Commerciali).[395] Although the Fascist Party had just tightened its authoritarian rule with the 1926 repressive laws,[396] IBM nonetheless could conduct business with the regime. The company only officially became "IBM Italia" in 1947, in post-WWII Republican Italy.[397] In its first 20 years of trading, IBM was one of the leading companies selling office equipment in Italy.

The year 1965 was particularly significant in IBM Italia's history for two reasons: first it began producing System/360,[398] having opened a large manufacturing plant in Vimercate (Milan). This consolidated IBM's position as a computer manufacturer in Italy, as well as Italy's position in the global IBM production cycle. Then, IBM Italia launched its company magazine *Rivista IBM* and produced its first marketing project for the public:[399] a computer-made print of Dante Alighieri's *Divina Commedia*. From this period, IBM increased its input in public debates by organizing cultural and editorial projects on computers' present and future influence in society. These projects were carried out by its local communication department (IBM Direzione Comunicazione, from now on IBM DirCom).[400]

IBM Italia's promotional activities are interesting because they demonstrate computing's rival macro-politics. On the one hand, some IBM communications mobilized Fear of Falling Behind, echoing the Closed World goals to establish a technologically advanced capitalist society, placing IBM Italia at the pinnacle of Italy's history of technology. On the other hand, the work done by IBM DirCom had a much more diverse undertone. Its perspectives more or less openly defied the Black Box Entanglement's promises by mobilizing either the Principle of Hope (intended as hope for the possibility of achieving a socialist society, and rejecting scientific socialism and other deterministic technopolitical perspectives), or Scientific Curiosity. These competing emotional practices were not directly in conflict, in the sense that they did not openly rebuke each other. Rather, they coexisted within the pages of *Rivista IBM* and the other promotional and cultural materials produced by the

395 On the history of IBM, see IBM Italia promotional materials: Direzione Comunicazione e Relazioni Esterne IBM SEMEA, ed., *Immagine/Comunicazione* (IBM SEMEA, 1993).
396 The laws that led to Gramsci's imprisonment and Turati's escape (see chap 2).
397 In 1990 IBM Italia became part of IBM SEMEA (Southern Europe, Middle East and Africa).
398 This machine was announced to the world the year before, in 1964.
399 Direzione Comunicazione e Relazioni Esterne IBM SEMEA, ed., *Immagine/Comunicazione.*
400 Idem.

company. Yet, I argue, they countered the Black Box Entanglement's Technopolitical Resonance, thereby re-politicizing computer debates. Together, they showed that different technopolitical paths existed, even in the age of IBM society and rationality.

3.1.1 IBM's cultural outreach in Italy. Overcoming Olivetti, establishing IBM

IBM Italia communications were managed by local division IBM DirCom.[401] It organized several activities: from publishing the company magazine *Rivista IBM* and producing books familiarizing the public with computers, to exhibitions and conferences. DirCom staff were influenced by the Italian design school, that emphasized aesthetics and artistic components.[402] From a visual perspective, DirCom productions resembled the innovative and cheerful Olivetti design style more than the austere and bland IBM image. At times, this was in sharp contrast with IBM headquarters instructions that favored the commercial aspect of their products.[403] But ultimately, IBM came to appreciate the Italian approach to design and communication: in 1974, Gianluigi Trischitta was promoted from IBM Italia DirCom to head of communications for the whole of IBM Europe.[404]

Regarding corporate communication, IBM Italia faced two major challenges. First, IBM had to be presented to Italians as a friendly and familiar organization. This need prevailed in any country where IBM operated, given the "alien" nature of computers and the many debates on their negative societal impact. Outside the USA, this need was even more pressing as IBM was not only vending an "alien" technology but was itself an "alien" company. Second, the Italian context was especially difficult because it already had a computer company, Olivetti. Thus, IBM not only had to find a way of becoming familiar to the Italian public, but also become at least as familiar as Olivetti. Overcoming these two challenges was essential to develop a convincing computer narrative that would win round Italians.

The 1965 printing of Dante's *Divina Commedia* had an important symbolic relevance in Italians' familiarization with IBM. It introduced two defining features of IBM Italia corporate communication, also implying crucial aspects of the politics sustaining IBM society.

401 In 1993, IBM DirCom became "IBM Foundation" (Fondazione IBM).
402 Raimonda Riccini, "Da Mostra a Exhibit: Il Rapporto Tra Elettronica e Design Nel Caso IBM Italia," *Ais/Design. Storia e Ricerche* 2, no. 3 (2014): 1–19.
403 Riccini.
404 Under his direction, IBM Europe organized a famous international exhibition on personal computers, "Exhibit", which traveled in 10 different countries from 1983 to 1984. See: Riccini.

At the micro-political level, the IBM *Divina Commedia* had a negative connotation, because it indirectly highlighted Adriano Olivetti's failure to establish an Italian computer manufacturer. The book also celebrated the National University Center for Electronic Calculus (Centro Nazionale Universitario di Calcolo Elettronico, CNUCE) at the University of Pisa, where the volume was compiled and printed. CNUCE was an offshoot of the new partnership between the University and IBM. The establishment of CNUCE had many positive outcomes, and certainly contributed to the diffusion of computer technologies in Italy.[405] It also underlined a significant difference in the micro-politics of computer design between IBM and Olivetti. The University of Pisa's first partnership in the computer sector had been established a decade earlier by Adriano Olivetti, with very different premises. Under the Olivetti agreement, the plan was to build a computer together and establish a new production line for Olivetti. In contrast, the IBM agreement resulted from the company donating one of its earlier machines to the university: the computer arrived at the same time as System/360 was announced.[406] This represented an important shift, from being directly involved in the development and design of a new computer, to finding uses for a ready-made machine.

At the macro-political level, the IBM *Divina Commedia* had a positive connotation: it showed that IBM also invested in humanistic culture, that would therefore have a place in IBM society. "You don't need to be Adriano Olivetti to combine an interest in computers with an interest in arts and culture," implied IBM. By choosing Dante, and particularly his *Commedia,*[407] IBM spoke directly to the heart of Italian cultural and historical identity. Dante Alighieri was a central historical figure for the development of contemporary Italian language, and one of the most celebrated symbols of the country's cultural heritage. This editorial project enabled IBM to present itself as a familiar presence, that could adapt to local culture and history. More importantly, it showed how IBM could help preserve and enhance Italian culture and history. In the following years, IBM Italia sponsored further computer-based projects involving Italian cultural heritage, from the ancient city of Pompeii to inventor and artist Leonardo Da Vinci.[408]

405 It was the first in Italy, and fourth in Europe, to connect to the Internet, and today manages the national .it domain.

406 Claudio Montani, CNUCE - Centro Nazionale Universitario di Calcolo Elettronico (AICA, 2000). https://www.aicanet.it/storia-informatica/calcolo-scientifico-in-italia/cnuce#link10, accessed September 20, 2022.; Corrado Bonfanti, "Mezzo Secolo Di Futuro: L'informatica Italiana Compie Cinquant'anni," *Mondo Digitale* 3, no. 3 (2004): 48–68.

407 The project's linguists suggested a less popular work by Dante, but IBM wanted it to be easily recognizable. The most important parts of the volume were the linguistic tables made with the computer: concordanze, rimario, frequenze, and the analysis made with a System 7090-1401. See: Dante Alighieri, *Divina Commedia* (IBM Italia, 1965).

408 IBM SEMEA, *Immagine/Comunicazione*.

Yet, the appreciation for local cultural heritage was only one macro-political aspect of IBM society. A more complex picture emerges from other cultural products by IBM DirCom. In 1965, it first published the earlier mentioned company magazine. *Rivista IBM*[409] targeted a non-specialized public, and was distributed in universities, cultural institutions, companies, and to IBM clients.[410] Its articles were in three main categories: the relationship between science, technology and society; economics, industrial politics, finance and management; computers and computer applications. *Rivista IBM* was managed by DirCom through an editorial committee, but external contributors wrote most of the articles. These were usually journalists, academics, scientists, and business people, including IBM managers.

The articles by foreign authors and by Italian IBM management often mobilized Fear of Falling Behind, thereby establishing Technopolitical Resonance with the US military-industrial complex, based on the Black Box Entanglement.[411] This fostered de-politicization: "mom IBM" had already thought of everything, Italians only had to embrace its rationality and long for its electronic pacifiers. Sometimes, the connection with the Closed World was very straightforward. In 1974, *Rivista IBM* published a rebuttal of the famous report on *The Limits to Growth*.[412] The article was by Herman Kahn, founder of conservative think tank The Hudson Institute and a key figure in the Closed World.[413] In his piece, "Towards the year 2000 and beyond," Kahn claimed there was nothing wrong with the current economic and industrial model, and that technology would solve any future problems. In his opinion, the world had become one large community where everyone enjoyed the same rights. Military strength was no longer necessary to obtain commercial agreements, workforce, territories and the like. According to Kahn, this social and political situation, coupled with scientific and technological developments, would result in a post-industrial society marked by generalized wealth and peace, with only occasional minor conflicts. Kahn's reasoning and arguments marginalized critical perspectives on technological development (the concerns expressed in *The Limits to Growth*), while depicting an idealized, technologically

409 The magazine was published until 1993, when its name changed to "If."
410 IBM SEMEA, *Immagine/Comunicazione*.
411 In a 1973 article, though, IBM Italia general director Ludovico Biraghi Lossetti interestingly criticized both the overly negative and overly positive perspectives on computers, "L'elaboratore Tra Mito e Realtà," *Rivista IBM*, 1973.
412 The report analyzed, through computer modeling, the long-term (un)sustainability of the current human and economic growth model. Donella H. Meadows et al., *The Limits to Growth; A Report for the Club of Rome's Project on the Predicament of Mankind* (Universe Books, 1972).
413 He was one of the "defense intellectuals" at Rand Corporation, the think tank founded by the US Air Force which had an important role in the Closed World discourse. Kahn was also the model for Kubrick's Dr. Strangelove. Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (MIT Press, 1997). 113-116, 316-320. Herman Kahn, "Verso Il 2000 e Oltre." *Rivista IBM*, 1974.

advanced capitalist society as the model to aspire to for solving current and future societal or political problems.

Articles by Italian IBM management mostly confirmed this vision, and stressed the urgency to keep up with US technological developments. In other words, they mobilized the Fear of Falling Behind. For example, in 1968, *Rivista IBM* published an article "Technological gap and computers" by IBM Italia Commercial Director Antonio Cacciavillani. He claimed the technological gap between Europe and the USA was mostly due to "organizational" issues. In particular, Europe had to invest in creating multinational companies like the USA, and implement their "rational" management style.[414]

The Fear of Falling Behind mobilized by IBM management was the same Fear of Falling Behind informed by the Black Box Entanglement, as exemplified by a 1979 special insert on "The challenge to renewal." It contained selected items from a conference organized by IBM with a similar title: "The Italian industry and the challenge to renewal." The first article, by IBM Italia CEO Renato Riverso, claimed that Italian industry needed to undergo a profound technological and managerial transition in order to maintain (or gain) a position in the changing economic landscape. In general terms, this was undeniable, and the Italian Communist Party made similar appeals. But the suggestions proposed at the IBM conference did not advocate greater investments in technology R&D, nor a local electronics and computer sector. Rather, they focused on the *introduction* of technology in Italian industries, and again the adoption of a "rational" management style guided by this technology. In other words, a black-boxed computer and more IBM rationality were needed to prevent falling behind IBM society.

Fear of Falling Behind was also mobilized in debates about Italian policy-making, showing how IBM Italia had an important role in fostering the Black Box Entanglement. A particularly significant article in the 1979 special insert was by Giancarlo Lizzeri, a manager at energy company ENEL and president of a government electronics task force.[415] Lizzeri was very positive about IBM and its involvement in Italy's computer plans. He criticized the famous report by Simon Nora and Alain Minc, that had been translated and published in Italian the same year.[416] The Nora-Minc report called for greater State involvement in the governance of computing and information technologies.

414 Antonio Cacciavillani, "Divario Tecnologico Ed Elaboratori Elettronici," *Rivista IBM*, 1968. 6-9.

415 This was a committee established in 1977 to draft the "Programma Finalizzato Elettronica del Ministero dell'Industria", a plan for electronics, computers and telecommunications in Italian industry. See: Legge 12 agosto 1977, n. 675 *Provvedimenti per il coordinamento della politica industriale, la ristrutturazione, la riconversione e lo sviluppo del settore*.

But, according to Lizzeri, the report's concerns over multinational companies' excessive power were exaggerated. What the country really needed was to accelerate the adoption of new technologies: "If going to another place requires twice the speed, then a slow run means falling behind, and this is certainly what is happening today,"[417] he concluded.

Overall, this 1979 special insert identified a series of undeniable problems in the relationship between Italian industry and technological development. But the solutions it offered ultimately matched the micro-politics of the Black Box Entanglement: it was not necessary to understand how technology worked and it was not necessary to produce it, nor investigate the best managerial style that could help Italian industry transition for the future. IBM had planned everything and it could provide new machines and a new "rational" organizational culture to solve Italy's problems. The only thing Italians had to do was buy the IBM machines and use them.

The mobilization of Fear of Falling Behind remained a constant in IBM Italia's outreach, establishing in this way Technopolitical Resonance with the US Closed World. At times, also IBM advertising mobilized Fear of Falling Behind, to indirectly intervene in contemporary political debates. For example, in 1976, *Rivista IBM* featured an advertising campaign on computers in Europe, celebrating IBM's impact there and stressing how "almost everything we sell in Europe is produced in Europe." But, the advertisement concluded, "the contribution that computers can make to Europe, especially in terms of increased productivity, depends on the right to buy and sell freely in a European market."[418] This admonition highlighted the growing European discontent towards IBM and other US multinational companies' power in the continent's electronic sector, suggesting that if Europe pushed for stricter regulations, it would fall behind IBM society. The mobilization of Fear of Falling Behind intensified in the 1980s, when *Rivista IBM* increasingly offered similar solutions for the Italian crisis. More competition, more free market, more production, were the keys to overcoming the crisis and fostering innovation in Italy.[419] But, as usual, these appeals largely focused on the use of computers, rather than increasing the country's technological know-how. The Black Box Entanglement was thus powerfully affirmed in these discourses.

416 Simon Nora and Alain Minc, *Convivere Con Il Calcolatore* (Bompiani, 1979), and *L'informatisation de La Société: Rapport à M. Le Président de La République* (La Documentation française, 1978).

417 "Se per andare in un altro posto occorre una doppia velocitá, correre poco significa andare indietro, e questo è certamente ció che ancor oggi sta avvenendo." Giancarlo Lizzeri, "Il Prodotto 'Informazione,'" *Rivista IBM*, 1979.

418 "Il contributo che l'elaboratore puó dare in Europa, soprattutto in termini di aumento della produttivitá, dipende dal diritto di acquistare o di vendere liberamente in un mercato Europeo." *Rivista IBM*, 1976, n. 1 (back cover).

419 See: Sergio Ricossa, "Benessere e Produttività," *Rivista IBM*, 1981; Roberto Pertile, "Indirizzare l'innovazione," *Rivista IBM*, 1985; Mario Deaglio, "Le Condizioni Dell'innovazione," *Rivista IBM*, 1986.

3.1.2 Make History, not Bombs. The Cold War in *Rivista IBM*

IBM DirCom's publications also contain traces of discourses which directly or indirectly challenged the Black Box Entanglement's macro-politics. The co-existence of different macro-political perspectives in IBM Italia communications was particularly visible from the late-1960s to the mid-1970s, under the direction of Gianluigi Trischitta (1968-69), Nino Regorda (1969-70), and Iva Bergamini (1970-1976).[420] For example, the same *Rivista IBM* issue with Herman Kahn's article, also contained a piece by anthropologist Margaret Mead, discussing violence in modern societies.[421] The two articles were not in direct opposition, because they addressed different topics. But, together, the arguments presented a fundamental incompatibility: could technological development alone lead to a world of peace and prosperity for everyone (as Kahn argued), or should human tendencies towards "violence" and "aggressiveness" be addressed as inevitable cultural phenomena (as Mead argued)? The simultaneous presence of these two perspectives established a dialogue between different macro-politics, therefore encouraging a re-politicization and countering the Technopolitical Resonance of the Black Box Entanglement.

The framing of the Cold War in IBM Italia's outreach exemplifies how this heterogeneity of perspectives challenged the Black Box Entanglement's appeal. IBM Italia's references to the Cold War often emphasized the need for cooperation and a peaceful resolution of global conflicts, likely influenced by two factors: first, the beginning of IBM's cultural outreach in Italy overlapped the *détente* period, thus Cold War discourses had generally toned down; second, Italy had very little to gain from a US/USSR conflict, because its geographical position made it a particularly vulnerable target in a potential war.[422]

Overall, peaceful solutions to existing global conflicts were strongly promoted in Italy. Peace appeals came not only from youth social movements and, starting in the 1970s, the Communist Party. Catholics also publicly called for an end to Cold War tensions. As early as 1963, Pope John XXIII issued the famous encyclical *Pacem in Terris* (Peace on Earth), calling for greater respect of human life and dignity in the political arena. This was an invitation to end all military conflicts, both real and projected, and make peace the main priority on the global political agenda.[423] The

420 IBM SEMEA, *Immagine/Comunicazione*.
421 Margaret Mead, "Aggressività e Violenza Nella Società Moderna," *Rivista IBM*, 1974.
422 Italy also had many US military bases.
423 Pope John XXIII's perspective contrasted with his predecessor's strong anti-communist stance and represented a fundamental turn for the Catholic Church. Paul Ginsborg, *A History of Contemporary Italy - Society and Politics 1943-1988* (Penguin, 1990).

persistence and ubiquity of these peace appeals can be seen as a regulating emotional practice, which encouraged international solidarity and brotherly love and discouraged national pride and ideological hatred.

This regulating emotional practice was also reproduced in IBM communications. Antonio De Falco observed in a 1969 article for *Rivista IBM*, that the US/USSR space race would be the key to understanding the current historical period. His article traced the history of space advancements from the Sputnik to Apollo 11. De Falco underlined the role of Fear of Falling Behind as a mobilizing emotional practice in the space race: "[The Sputnik] revealed a disconcerting delay in the USA, in the whole technology sector: from nuclear missiles to scientific research applications. America's reaction was sometimes hysterical, it was feeling defeated and in danger."[424] This prompted the US government to massively invest in the technology sector, leading to Apollo 11's success. De Falco, however, criticized those who saw the Apollo 11 as a competition against the USSR. He envisioned the space race as a force for peace, because it moved the conflict from the military to the technological arena. Therefore, "there is nothing shameful in the fact that the Soviet Union had to slow down its space effort. Given our advancements in space technology, given the results we have achieved, and the perspectives we have in front of us, it is quite absurd to keep looking at things in terms of a race. And this is true for both sides, of course. It is time for cooperation,"[425] he observed.

The emphasis on cooperation rather than competition was also present in IBM's popular booklet for primary school children: *La macchina delle informazioni* (The information machine).[426] For the first edition published in 1977, 140,000 copies were printed: its success in schools led to three more booklets, this time for middle school students, then a reprint of the first one in 1981.[427] The booklet presented statements about the qualities of "machines" (e.g. "Machines transform things"; "machines do not think"), with illustrations of machines and their use throughout history. The pictures mostly depicted scientific experiments, machine prototypes, and technology-related themes. Two contemporary events were also depicted. One was the USSR-US encounter between

424 "Il satellite artificiale sovietico rivelava uno sconcertante ritardo degli Stati Uniti in tutto il settore, dai missili miltari alle applicazioni di ricerca scientifica. L'America aveva reazioni in qualche caso isteriche, sentendosi battuta e sentendosi in pericolo." Antonio De Falco, "La Corsa Alla Luna," *Rivista IBM*, 1969. 3.

425 "Se l'Unione Sovietica, dicevamo, ha dovuto rallentare il suo sforzo spaziale non c'è nulla di vergognoso. Al punto in cui siamo con le tecnologie dello spazio, con i risultati acquisiti, con le prospettive che si presentano, è abbastanza assurdo continuare a vedere le cose in termini di gara. E questo vale per gli uni e per gli altri, si capisce. È tempo di cooperazione." De Falco. 7.

426 *La Macchina Delle Informazioni* (IBM Italia, 1977).

427 IBM SEMEA, *Immagine/Comunicazione*. 34.

the spaceships Apollo and Soyuz (1975), to illustrate the advancement in space technologies. The other was the record set by Soviet athlete Tatjana Kazankina in the 800 meters women's final during the 1976 Montreal Olympics, to exemplify the concept "information," in this case her world record. These two examples are interesting because they addressed the Cold War from a neutral, if not Soviet-friendly, perspective, significantly diverging from US Closed World goals. Out of all the examples illustrating the space race, IBM DirCom chose a moment of encounter and cooperation, rather than a US "victory." And of all the athletes who won medals or set records at the Montreal Olympics, they chose a Soviet one.

In the 1970s, *Rivista IBM* also defied the Black Box Entanglement's macro-politics through book reviews. Some of the magazine's contributors had links with Olivetti, or socialist sympathies.[428] Although these reviews did not employ emotive language, I argue that they performed a mobilizing emotional practice because of their symbolic significance. As I discuss later, the Italian left largely envisioned IBM as a symbol of US capitalism. Opening an issue of *Rivista IBM* and finding positive reviews of books about Lenin and the Paris Commune most likely evoked an emotion response, especially in left-wing sympathizers. Arguably, the presence of these reviews encouraged hope in the possibility of a different political and societal path than IBM society—a path based on socialist values. In other words, it mobilized the Principle of Hope.

An exemplary figure in this context was the historian Arturo Colombo,[429] who in the 1970s often contributed book reviews and authored articles for the magazine. Colombo's reviews challenged the Black Box Entanglement because they highlighted the existence (and validity) of different political systems than US Cold War capitalism. In 1971 Colombo reviewed a book on the Paris Commune by British historian Alistair Horne.[430] Colombo emphasized the Commune's merits. In his view, Horne's reconstruction was thorough and detailed, yet failed to convey the Commune members' genuine hope for a new society. Colombo in fact suggested reading another book besides Horne's:

428 Jurist Mario G. Losano contributed book reviews on the relationship between society and technology, and legal themes. Losano had ties with Olivetti and participated in the Olivetti conference and PCI conferences as a computer expert. He was one of the main intellectuals the Italian Communists referred to for technology issues. Losano acquired vast expertise in cyber law and was a pioneer in Italy and internationally. See: *Giuscibernetica. Macchine e modelli cibernetici nel diritto*, (Einaudi 1969); *Corso di informatica giuridica* (Cooperativa Universitaria Editrice Milanese 1971); *Corso di Informatica Giuridica*, 3 vols, (Einaudi, 1985-6). In 1991 Losano published a book with Fondazione Adriano Olivetti: *Saggio sui fondamenti tecnologici della democrazia* (Quaderni della Fondazione Adriano Olivetti, 1991).

429 Today he is most famous for his studies on Italian liberal-socialist and federalist political thinkers. Early on, he specialized in the history of socialism and the Russian Revolution. See: *Lenin e la rivoluzione* (Le Monnier, 1974); *Lev Trockij, Terrorismo e comunismo*, (Sugar.Co, 1977) (Colombo was the translator, and authored the introduction). Colombo had an intellectual friendship with Adriano Olivetti and wrote a long eulogy celebrating his political and moral commitment. See: Arturo Colombo, "Adriano Olivetti," *Il Politico* 25, no. 1 (1960): 202–5.

430 Arturo Colombo, review of *L'assedio e la comune di Parigi*, by Alistair Horne, *Rivista IBM*, 1971.

the *History of the Paris Commune* by journalist and Commune member Prosper-Olivier Lissagaray.[431] In 1972, Colombo presented *Il capitalismo italiano nel novecento* (Italian capitalism in the 20th Century),[432] a collection of essays by Italian political thinkers who supported and opposed capitalism (notably essays by Italian Communist Party founders Antonio Gramsci and Palmiro Togliatti). In 1973, in a special review of books about education, he reviewed the works on "deschooling" by Ivan Illich and Everett Reimer, along with an edited volume on "deschooling in the technological era."[433] Although critical of Illich and Reimer, who he deemed too radical, Colombo recognized that they pinpointed key issues in the changing relationship between educational institutions and society.[434]

Colombo's reviews were not the only ones to challenge the Black Box Entanglement's macro-politics. In 1972, *Rivista IBM* published a positive, unsigned review of Maurice Dobb's *History of Soviet Economy* in Italian by Editori Riuniti, the Italian Communist Party's publisher.[435] *Rivista IBM* reviewed Colombo's own book on Lenin,[436] in the same issue as a review of Meir Merhav's *Technological dependence and underdevelopment*, stressing the limitations of monopolistic companies to foster economic and societal development.[437] Since IBM was one of the period's monopolistic companies *par excellence*, Merhav's book indirectly questioned the desirability of IBM rationality.

Together, these emotional practices performed through Cold War declarations and book reviews countered the Technopolitical Resonance of the Black Box Entanglement, promoting a re-politicization of computing's macro-politics. These examples should not let us assume that the Principle of Hopeful Curiosity was amplified because the micro-politics of computing were not significantly addressed. Resonance was established with Bloch's Principle of Hope, because the regulating and mobilizing emotional practices discussed here did promote the values of solidarity, peace, and cooperation also central in Bloch. In doing so, they pointed at socialism as a feasible political project, countering the idea that technological development alone could be the driver of human well-being.

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431 Prosper-Olivier Lissagaray, *La Comune Di Parigi* (Feltrinelli, 1971), and *Histoire de La Commune de 1871* (Henry Kistemaeckers, 1876).
432 Arturo Colombo, review of *Il capitalismo italiano nel novecento*, by Lucio Villari, *Rivista IBM*, 1972.
433 Ivan Illich, Descolarizzare La Società (Mondadori, 1973); Everett Reimer, La Scuola è Morta (Armando, 1973); William K. Richmond and Mauro Laeng, La Descolarizzazione Nell'era Tecnologica (Armando, 1973).
434 Arturo Colombo, review of Illich, Reimer, Richmond and Laeng, *Rivista IBM*, 1973.
435 Arturo Colombo, review of *Storia dell'economia sovietica*, by Maurice Dobbs, *Rivista IBM*, 1973.
436 Review of *Lenin e la rivoluzione (review)*, by Arturo Colombo, *Rivista IBM*, 1972.
437 Angelo Cerizza, review of *Dipendenza tecnologica e sottosviluppo*, by Meir Merhav, *Rivista IBM*, 1974.

3.1.3 Three Centuries of Technological Determinism. An IBM History of Technology

From the mid-1970s, the history of science and technology became a crucial terrain where IBM DirCom de-politicizing and re-politicizing discourses were played out. Some of IBM DirCom's editorial projects turned to a very linear and deterministic understanding of the history of technology, fostering a de-politicizing discourse addressed in this subsection. Emotional practices centered on Fear of Falling Behind played a prominent role in this process. But, as we shall see in the next subsection, history also became a tool to challenge this deterministic understanding.

A striking example of IBM de-politicizing the history of technology was the book *Tre Secoli di Elaborazione Dati* (Three centuries of data processing), a history of data processing from the mid-1600s to 1970. It was edited by Roberto De Prà, a DirCom employee and from 1976 editor-in-chief of *Rivista IBM*. The book was DirCom's most reprinted publication.[438] The first edition appeared in 1974,[439] for the opening of an IBM-sponsored permanent computer exhibition at Milan's National Museum of Science and Technology. Many editions followed and by 1981, more than 50,000 copies of the book had been published.[440] The last reprint was in 1984. *Tre Secoli di Elaborazione Dati* started with a short but detailed overview on the history of computing, covering all the main computer innovations and applications since Blaise Pascal's mechanical calculator. The book's core was a documented collection of computing history, with a specific focus on Italy. This was a series of pictures, documents, articles and other visual materials with short captions underneath. The book was elegantly designed, and in 1979 won the (Italian) Organization for Industrial Design's prestigious "Compasso d'Oro" (Golden Compass) award for visual communication,[441] which Olivetti products had also won in the past.

The book amplified the Technopolitical Resonance of the Black Box Entanglement, similar to the IBM management discourses mentioned in 3.1.1. While the *Rivista IBM* examples typically focused on present and future temporalities, this book focused on the past, to legitimize and sustain the claim that the "Computer Age" was indeed a product of IBM. The book's underlying message was that Italy could be part of the history of computing thanks to IBM's presence there: without IBM, Italy would fall behind the Computer Age. And, in the company's view, Italy should want to be part

438 Author's deduction, based on research and IBM DirCom *Immagine/Comunicazione* (IBM SEMEA).
439 Author used the 1981 edition.
440 *Immagine/Comunicazione.* 9.
441 *Idem*.

of this IBM Computer Age. The book's introduction presented the latest developments in the computer sector as revolutionary. Modern computer terminals were defined as "intelligent," and mathematical modeling through computers was seen as the way to predict the future accurately. The introduction concluded by promoting the myth of the computer as a tool for people's freedom: "Computers are only machines, but they are machines which can free men from the most boring and repetitive jobs, to allow him to think and have ideas, to expand his creativity and his imagination."[442] All these promises, as seen in chapter 1, were fundamental for the Black Box Entanglement in the USA. The book suggested that Italians were ready to be part of the computer revolution: Italian debates, initially fearful and suspicious of computers, were later enthusiastic about them, having moved past all the myths and misconceptions.

The history presented in the book was remarkably US-centric and IBM-centric, reinforcing the idea that only one macro-political path was possible to enter the Computer Age. The Closed World goals were reaffirmed. The wonders of SAGE, and all the US success in the space race were depicted, such as the Explorer, Project Mercury, and Project Gemini. However, there was no mention of the Sputnik, or any other Soviet advancement in technology. This one-sided presentation of the Space Race was very different from the one discussed earlier, which emphasized the importance of cooperation among the Cold War super powers.

Furthermore, in the lengthy section on the history of computing in Italy, Olivetti was only mentioned twice. This lack of mentions had two implications. First, it showed that alternative micro-politics of computing were not contemplated in the Computer Age. Second, it reaffirmed that only IBM could bring Italy in the computer age: dreams of restoring Olivetti's Golden Age were hopeless. The first time the book referred to Olivetti, was about its pioneering role in establishing mechanographic centers in Italy.[443] This was accompanied by a picture of an Olivetti typewriter advertisement. The second reference was the Olivetti mainframe computer: "1959. Presenting the ELEA (Arithmetical Electronic Computer). It is designed and built into series by Olivetti for scientific and commercial purposes."[444] This brief description accompanied a very indistinctive black and white picture of the otherwise quite colorful ELEA, with no visible brands, impossible to spot as an Olivetti product among countless similar pictures of IBM machines. The famous

442 "L'elaboratore elettronico è semplicemente una macchina, ma una macchina che puó liberare l'uomo dai lavori noiosi e ripetitivi, per consentirgli di pensare e di ideare, di espandere la sua creativitá e la sua immaginazione." Roberto De Prà, ed., *Tre Secoli Di Elaborazione Dati* (IBM Italia, 1981).

443 De Prà, 38.

444 "1959. Viene presentato l'ELEA (Elaboratore Elettronico Aritmetico), progettato e costruito in serie dalla Olivetti per impieghi scientifici e commerciali." De Prà. 119.

Programma 101, not just a source of national pride but also a successful product in the USA,[445] was never even mentioned.

This IBM history of computing was heavily de-politicized. The unfolding history of computing was presented independently from other fundamental historical events, and there was no critical reflection or contextualization about how machines were used over time. Of course, the book was meant for the general public, and not the place for a critical historiography essay. However, there were many points where further historical framing could have been added. Focusing on the Italian context, IBM opened its first Italian branch under Fascism, so the consolidation of IBM in Italy happened in parallel, and in partnership, with the consolidation of the fascist regime. This uncomfortable aspect was left out of the book entirely. Examples from the regime years were included in the story line. To celebrate the pioneering use of computers in the Italian insurance sector, for instance, the book presented an historic advertisement, with red text on a white background: "Italians, do welcome with sympathy and benevolence the agents of the National Insurance Institute!"[446] The advertisement was from 1936, and the agents of the National Insurance Institute were working for Mussolini's regime. Another example: it was casually mentioned how in 1939, the IBM offices in Milan and Turin worked in partnership with the (fascist) "Ministry for Italian Africa" to take note of "commerce with colonies."[447] These colonies were the countries known today as Lybia, Ethiopia, and Eritrea, where Italians enslaved, tortured, raped, and killed hundreds of thousands of people while doing their "commerce."[448]

After this book, other historical publications followed, now focusing solely on Italy, continually pointing at technological development as a significant historical force. Examples are two documentary booklets: *Progresso a Venezia* (Progress in Venice, 1976) and *Il Fiume* (The River, 1977), edited by Angelo Cerizza and others.[449] In this case we cannot speak of the Black Box Entanglement, because computers were not involved and local tinkering with technology was actually encouraged. However, the booklets reinforced the deterministic understanding of history espoused by *Three Centuries of Data Processing*, and the idea that technological development was a crucial tool for not falling behind an idealized future of generalized prosperity and wealth.

445 Programma101 was used for the Apollo program. Massimo Guarnieri, "Early Italian Computers: Pier Giorgio Perotto's P101," *IEEE Industrial Electronics Magazine* 14, no. 3 (2020): 92–96.
446 "Italiani, accogliete con simpatia e benevolenza gli Agenti produttori dell'Istituto Nazionale delle Assicurazioni!", De Prà, *Tre Secoli Di Elaborazione Dati*. 35.
447 De Prà, 41.
448 Angelo Del Boca, *Italiani, Brava Gente?* (Neri Pozza Editore, 2011).
449 Cerizza was a historian who in the 1970s oversaw many history-based outreach projects for IBM. He was on *Rivista IBM*'s editorial committee, and became editor in chief after Roberto De Prà in 1986.

The two books were mostly a collection of historical documents, showing how in the past, Italians used technology to overcome nature-related problems and fears. The documents reported debates voicing different opinions, but the more technology-friendly side always had the last word. The first book focused on the city of Venice and its struggle with the sea in the 1800s. The author explained that there was strong enthusiasm for "progress" in the 19th century, but also a need to adapt it to the specific needs of a city torn between the land and the sea. The second booklet was about the river Po, which runs along heavily industrialized areas. The 18th and 19th century documents were presented with minimal or no commentary, again showing the human technical interventions that shaped and controlled the natural environment. The language used in the introduction was evocative: "this brief collection of articles […] shows how during the years when modern society was born, beside the ancient, almost fatalistic fear of floods, there was also the hope for an industrial development sustained by the river: no longer as an enemy, but as a contained and corrected river, transformed into a waterway for commerce and industry."[450] Technological development was thus depicted as the solution for human concerns, and the main catalyst for economic and industrial progress.

3.1.4 The importance of being Leonardo. The historicization of technology at IBM Italia

From the late 1970s, the history of science and technology also became a tool to challenge deterministic perspectives on technological development, thus weakening the Black Box Entanglement's promises. IBM DirCom also produced materials that fostered an historicization of technological development. They represent a deviation from the deterministic and linear historical framing implied by Fear of Falling Behind. IBM DirCom's historicization of technological development indirectly challenged the notion that computers were the pinnacle of an unprecedented period of progress, leading humanity to a bright new future under the guidance of US capitalism. It therefore also challenged the idea that falling behind this history was an urgent concern, or even a concern at all. This process of historicization mobilized Scientific Curiosity to question the macro-politics of the Black Box Entanglement. But the "science" to be curious about was not computer science: it was the history of science and technology. Yet, we cannot claim this was the Principle of

450 "La breve raccolta di articoli […] mostra come egli anni in nacque la societá moderna, all'antico quasi fatalistico, timore delle piene, si affiancasse la speranza di uno sviluppo industriale sostenuto da un fiume non piú nemico, un fiume imbrigliato e corretto, trasformato in una via d'acqua per commerci e industrie." Angelo Cerizza, ed., *Il Fiume* (IBM Italia, 1977).

Hopeful Curiosity, because socialist themes were not significantly and openly involved in the discourse.

IBM's interest in Italian cultural heritage proved to be a tool for the historicization of technology. A highly publicized IBM project on Italy's history of technology was an exhibition on Leonardo Da Vinci's machines, held in 1983 and 1984.[451] The exhibition traveled to ten cities, in Italy and abroad, then became part of the permanent collection in the new Da Vinci Museum in Leonardo's hometown, Vinci. The exhibition displayed detailed wooden reconstructions of Leonardo's mechanical models, designed with IBM computers. It was indeed remarkable work, and the models are still some of the very few existing reproductions of this kind existing today. The exhibition was the second IBM DirCom project entirely focused on the work of an Italian historical figure, after the 1965 *Divina Commedia* book. But whereas Dante was a poet, Leonardo was (also) an inventor: in this sense his work also opened a window on the history of technology, presenting a different scenario than the one described by IBM's deterministic accounts.

In the exhibition catalog, Angelo Cerizza and Carlo Alberto Segnini authored an essay explaining the significance of Leonardo's technical work from a historical perspective.[452] The second section was an overview of the scientists, inventors, and engineers who had worked, before and after Leonardo, on similar projects.[453] The many examples in this overview indirectly raised the question: how can we believe there was only one road and one timeline for technological development, when people in the past already envisioned many contemporary inventions, also independently from each other? The figure of Leonardo Da Vinci was indeed emblematic in this sense: he "foresaw" several future inventions, from the airplane to the submarine. He did not have the technical means and knowledge to build functioning prototypes, but nonetheless he tried. Those who build airplanes today have more advanced technologies, but Leonardo (and others) imagined this technology hundreds of years ago. Who was the "innovator," then?

Two special issues on the history of science and technology are particularly interesting for further observing the historicization of technological development in IBM communications. The first was a special issue on science, published as a *Rivista IBM* supplement in 1979. The second was a special issue on the history of technology in 1985.

451 *Laboratorio Su Leonardo* (IBM Italia, 1983); IBM SEMEA, *Immagine/Comunicazione*.
452 Angelo Cerizza and Carlo Alberto Segnini, "Il Cammino Della Tecnologia," in *Laboratorio Su Leonardo* (IBM Italia, 1983), 37–45.
453 The first part was "The path of technology" in the history of science and technology. *Laboratorio Su Leonardo*.

The 1979 special issue was compiled by Antonio Steffenoni. The original plan was that Marcello Cini would write the article on "science and society."[454] The plan didn't go through, and the theme was analyzed by the less politicized Paolo Casini, a philosopher and historian of science. The first two essays were written by Marxist intellectual Ludovico Geymonat. Many of the essays, including those by Geymonat, had an historical perspective. Overall, the special issue presented a critical perspective on linear and deterministic attitudes to scientific development, while mobilizing Scientific Curiosity. As discussed by Steffenoni and Corrado Mangione in the introduction, the contributors to the special issue highlighted that today, "scholars and researchers [...] refuse to hide behind easy certainties, and they have the courage to expose their crises and impasses. They have the courage to suggest, every day, the possibility of a mistake, of a temporary delay to scientific development."[455]

Scientific Curiosity was also mobilized in the 1985 special issue on the history of technology. History professors from various research fields were invited to write essays on machines and technology in the history of humankind, from ancient history to the 20th century. As in the Leonardo Da Vinci exhibition essay, historiography showed that technological development did not necessarily follow a linear trajectory. Furthermore, these contributions often evidenced how multiple social groups were involved in the history of technology, not only engineers and scientists. This indirectly presented a second challenge to the Black Box Entanglement: IBM engineers were not the only actors who could contribute to the history of computing, nor the ones who knew more than anyone about the best way to use computers. For example, Dante Zanetti, a demographic and economic historian, wrote about technological innovations created by common people in preindustrial societies.[456] Marzio Romani, an economic historian, underlined the importance of oral tradition in the transmission of technical knowledge,[457] And Giovanni Vigo, also specializing in economic history, discussed the path of steam power, from a technology only used in the industrial sector to its popularization in domestic and recreational settings.[458]

454 See: Letter by Steffanoni to Dario Romano, May 6th, 1977. In ASPI, Archivio Storico della Psicologia Italian https://www.aspi.unimib.it/collections/object/detail/3343/, accessed September 20, 2022..

455 "Gli studiosi e i ricercatori, in altre parole, rifiutano di nascondersi dietro a facili certezze e hanno il coraggio di esporre i propri momenti di crisi e di impasse. Il coraggio di riproporre ogni giorno la possibilitá dell'errore, di un momentaneo arresto del proprio sviluppo." Corrado Mangione and Antonio Steffenoni, "'Fare Scienza', Oggi," *Rivista IBM*, 1979.

456 Dante Zanetti, "Con l'opra in Man, Cantando," *Rivista IBM*, 1985.

457 Marzio A. Romani, "Piú Pratica Che Grammatica," *Rivista IBM*, 1985.

458 Giovanni Vigo, "L'alba Inquieta Del Vapore," *Rivista IBM*, 1985.

The final article offered a cultural history perspective on industrial imaginaries and technological utopias. It was written by Valerio Castronovo, a contemporary history professor and founder of a magazine about science and history called *Prometeo* (Prometheus). Castronovo discussed how technological development was perceived in cultural and artistic movements, from the Enlightenment until contemporary times. The essay ended with a critical note on positivist perspectives enduring in the current age, and mobilized skepticism over the promises of technological determinism, therefore countering the Black Box Entanglement: "Neither the advent of idealism, nor the spiritualist reaction against mechanicism and materialism, and not even the passage of science from the universe of certainties to the universe of simple probabilities, were able to dissolve what became—with the idea of linear and cumulative progress, through the first developments of a mass society—a generalized utopia, an ideological and political stereotype, and, in some cases, a huge factor for cultural and social mobilization or reassurance."[459]

Through these two special issues, IBM DirCom again opened up to a re-politicization of the macro-politics of computing, because foundational assumptions of the Black Box Entanglement were questioned. IBM DirCom confronted its readership with the fact that computers were only one component, albeit important, in a larger and more complex historical context. Moreover, history of technology was not to be seen as an uninterrupted trajectory towards a better life, as other IBM communications implied. Having debunked "the idea of linear and cumulative progress," was it still credible to claim that everyone had to embrace IBM rationality, and IBM computers, in order to not fall behind the Computer Age? For some people, yes. But a certain mistrust over the idea of unbridled linear progress remained. As Giovanni Vigo observed in a 1986 *Rivista IBM* article, "Today we think that we left behind us the age of superstition and prejudice, and that we have substituted it with science and rationality. But this is only a presumption: the day when science and reason will be allies in solving humanity's problems seems, unfortunately, still very far off."[460]

IBM DirCom publications showed that the macro-politics of the Black Box Entanglement, and their deterministic assumptions, were a contested theme even at IBM, one of the most globally

459 "E tuttavia né l'avvento dell'idealismo né la reazione spiritualista contro il meccanicismo e il materialismo, e neppure il passaggio della scienza dall'universo delle certezze a quello delle semplici probabilitá, valsero a dissolvere quella che -con l'idea di un progresso lineare e cumulativo- era ormai diventata, con i primi sviluppi della societá di massa, un'utopia generalizzata, uno stereotipo politico-ideologico e, allo stesso tempo, a seconda dei casi, un poderoso fattore di mobilitazione o di rassicurazione sociale e culturale." Valerio Castronovo, "Il Demone Del Cambiamento," *Rivista IBM*, 1985.

460 "Oggi presumiamo di esserci lasciata alle spalle l'etá della superstizione e dei pregiudizi e di averla sositutita con la scienza e la razionalitá. Ma è, appunto, solo una presunzione: il giorno in cui scienza e ragione si troveranno alleate nella soluzione dei problemi dell'umanitá sembra, sfortunatamente, ancora molto lontano." Giovanni Vigo, "Tecnica, Scienza e Storia," *Rivista IBM*, 1986.

recognized symbols of US high-tech capitalism. Company management, and at times also DirCom, established Technopolitical Resonance with the US military-industrial complex and its Closed World. But other perspectives were represented, showing that several technopolitical options existed besides IBM society and its rationality. And IBM DirCom was only the tip of the iceberg.

3.2 IBM Italia labor unions and the Black box Entanglement

IBM DirCom was not the only section of IBM Italia that challenged the promises of the Black Box Entanglement. IBM's consolidation and growth in Italy actually happened in parallel with its labor unions. A crucial year for IBM labor unions was 1969. The Italian 1969 autumn is known as "Autunno Caldo" (Hot Autumn), after very intense political activity in Italian factories, including strikes, marches, blockades, and occupying buildings.[461] In this period, a group of workers revitalized and renewed IBM labor unions, which became more vocal in criticizing the company and reclaiming a role in its decision-making. Furthermore, the workers movement's achievements fostered greater cooperation between labor unions in various companies. Major achievements were the "Statuto dei Lavoratori" (Workers' Charter)[462] in 1970 and the establishment of the Metal Workers Federation (Federazione Lavoratori Metalmeccanici, FLM) in 1972.[463] This meant that, although small in size, IBM labor unions could count on a wider network of support and exchange.

IBM Italia labor unions were quite unique in the local context. IBM unionists were ironically called "the Indian reservation" by counterparts in other companies, to signal their divergence from the other unions, but also the exceptionalism of their presence at IBM.[464] Indeed, some of the other labor unions' key struggles, for example the reduction of working hours and wage increases, did not apply to the IBM situation. A job at IBM provided first-hand experience of what it meant to work in a technologically advanced multinational company guided by a "rational" management style. This was not the norm in Italy, but rather a model to which other companies (according to IBM) should aspire if they wanted to succeed in global capitalism.

From a global perspective, the situation with IBM Italia labor unions was also unusual. IBM was known for its hostility towards labor unions and its union-busting activities.[465] In Italy the labor unions not only existed (as in most other European countries), but also managed to organize strikes notwithstanding their reduced numbers, thanks to the presence of a larger, and much stronger workers' movement.

461 For the historical background, see Ginsborg.
462 Statuto dei Lavoratori granted rights and established procedures for workers.
463 This is relevant because many IBM workers incorrectly came under the official category of "Metal Workers."
464 IBM Italia RSU interview, January 2020.
465 As reported by James Cortada: "All employees were anonymously surveyed for their opinions of their management, jobs, and about IBM. Their local management met with groups of them to discuss how to address areas of concern, some of which they feared might lead to establishment of unions. Meticulous records of these events were kept. If management became aware of union organizing, investigatory teams formed to find ways to discourage formation of a union, unless required by law. Unions did not exist in most of IBM's national companies." James W. Cortada, *IBM: The Rise and Fall and Reinvention of a Global Icon* (MIT Press, 2019). 261 (ebook)

Consequently, IBM labor unions produced an encompassing analysis of how the company management mobilized Fear of Falling Behind, thus weakening the possibility of IBM management to establish Technopolitical Resonance with other actors. First, they pointed out that IBM rationality was nothing else than a technology-intensive iteration of classic US capitalism: IBM rationality was not an "objective" de-politicized construct, but the product of specific macro-politics. Second, IBM labor unions also challenged the micro-politics of design in the company, pointing out how IBM products were often "black boxes" even for IBM employees. While standing up to IBM management's mobilization of Fear of Falling Behind, labor unionists also powerfully mobilized another emotion: Working Class Pride. In this way, they encouraged a re-politicization of the macro and micro-politics of computing at IBM, centered on how workers directly experienced these politics.

3.2.1 Internal Committees, Study Groups and Factory Councils. A brief history of labor unions at IBM Italia

When IBM opened its first Italian branch in 1927, the fascist regime had just made all labor unions illegal: in 1926, the Internal Committees (Commissioni Interne) formed by labor unions were replaced with the confederation of fascist labor unions. This situation was unofficially reverted in 1943 with the regime's fall, when workers again formed Internal Committees. The freedom to create labor unions became official in the Italian Constitution of 1946, and the relevance of Internal Committees was further sanctioned in a 1947 agreement between the industrialist organization Confindustria and the labor union CGIL.

We can trace IBM Italia labor unions back to the early 1950s.[466] The Internal Committee consisted of representatives from the two main labor unions at the time:[467] CGIL (Confederazione Generale Italiana del Lavoro, Italian General Confederation of Labour) with its affiliate FIOM (Federazione Italiana Operai Metalmeccanici, Italian Federation of Metalworkers), and CISL (Confederazione Italiana Sindacati Lavoratori, Italian Confederation of Workers' Trade Unions) with its affiliate FIM (Federazione Italiana Metalmeccanici, Italian Federation of Metal Mechanics). CGIL-FIOM was connected to the Italian Communist Party and popular with blue-collar workers, while CISL-FIM

466 From evidence in the IBM RSU archive.

467 Other labor unions were the social-democratic UIL (Unione Italiana del Lavoro, Italian Labor Union) and anarcho-syndicalist USI (Unione Sindacale Italiana, Italian Workers' Union). UIL, together with CISL, stemmed from CGIL in 1950 when the communist faction became majoritarian. USI began in the 1910s, was dissolved by the fascist regime, then reformed following the CGIL split.

was connected to the Christian Democracy and popular with white-collar workers.[468] In this period, the IBM Internal Committee's work was more like that of other labor unions, as it dealt with issues such as reduced working hours, wage increases or the distribution of production bonuses.[469] This changed in the following decades, as we will see.

Particularly towards the late 1960s, the Italian Workers Movement grew quantitatively and qualitatively. Working conditions at IBM were quite privileged, and the labor unions did not have a significant base compared to other large Italian companies, for example car company FIAT. IBM's workforce was also generally more qualified than the average factory worker who took part in the 1969 protests. However, the protest wave culminating in the Hot Autumn greatly impacted IBM.

In the 1960s, the status and role of white-collar workers, especially "tecnici" (technicians) became increasingly central in the Italian workers movement. This process underlined a key contradiction in the macro-politics of the Black Box Entanglement: computers were supposed to bring the world into a bright new era of widespread wealth and progress, yet white-collar workers felt increasingly similar to their blue-collar colleagues. In 1964, FIOM-CGIL organized its first "Conferenza Nationale per i tecnici e gli impiegati" (National conference for technicians and employees), followed by a second in 1969. These opportunities for debates on the role of "technicians and employees" were particularly important for IBM workers, as many came under the category of technicians. The key question was whether white-collar workers should be considered part of the workers movement or not. Traditionally, blue-collar workers had instigated the Workers Movement. But changes in the organization of work, most notably the increased use of automation, led many white-collar workers to identify with the struggles of the historic blue-collar Workers Movement. This identification was informed by the progressive "proletarization" of the middle class under capitalism, theorized by Marx. In the Italian left there was a particular emphasis on the "proletarization of technicians" within industrial work.[470]

Another key process in the 1960s was the increasing critique levelled at Internal Committees, often judged as too distant from workers and not effective enough. During the Hot Autumn, many workers spontaneously formed Factory Councils (Consigli di Fabbrica, CdF). These were assemblies of workers similar to the Russian Soviets, first established in Italy by socialists and

468 Verbale delle votazioni - elezioni della Commissione Interna, 1953 – IBM RSU archive.
469 See 1950s-1960s documents in IBM Italia RSU archive.
470 Sergio Bologna and Francesco Ciafaloni, "I Tecnici Come Produttori e Come Prodotto," *Quaderni Piacentini*, 1969.

anarchists in the 1910s, then swept away by the fascist regime. Factory Councils were not based on a group of representatives like the Internal Committees. Some of the workers acted as "delegates" to negotiate with company management, but always closely connected to the larger base. The new model was officially approved under the Workers' Charter of 1970. This unique piece of legislation was one of the most successful outcomes of the Hot Autumn and the 1960s workers protests. The Workers' Charter established a series of requirements which had to be respected by most employers in the country. Among these was the Company Labor Union Representation (Rappresentanza Sindacale Aziendale, RSA), based on the Factory Council model.

The Hot Autumn therefore represented a turning point for the relationship between IBM workers and the larger Workers Movement: it was in this period that most of the issues concerning future struggles were defined. In March 1969, IBM workers founded a Study Group (Gruppo di Studio, GdS),[471] aiming to provide a forum for workers' discussion other than the existing Internal Committee, which was judged too stiff and conforming too much to company management. The IBM Study Group organized strikes and demonstrations and was responsible for producing pamphlets and other written documents to distribute among fellow IBM workers.

The IBM Study Group had heterogeneous members: mostly technicians, a former supervisor who asked to be downgraded for political reasons, another supervisor described as being "in crisis," and some workers unionists. This also translated into a certain cultural and political heterogeneity, as there were both Catholics, Marxists, and former Liberals. During its brief existence, part of the Study Group became increasingly disillusioned with the labor unions' culture and practices. In the early 1970s, the group stopped using the name "Gruppo di Studio IBM" as its members opted for either a greater involvement in labor unions (as we shall now see) or in the grassroots left (section 3).

Notwithstanding its short life, the Study Group was significantly influential in the establishment of a "class consciousness" between IBM workers, and as a milestone in the history of the IBM Company Labor Union Representation (RSA). The Study Group's relevance was noted in a 1977 article by CISL-FIM IBM workers unionists Paolo Bogo and Giancarlo Toloni, published in the magazine *Gioventú Evangelica*.[472] The article entitled "The IBM Factory Council from 1969 to

471 On the history of the IBM Study Group see: Paolo Bogo and Giancarlo Toloni, "Il Consiglio Di Fabbrica IBM Dal 1969 Ad Oggi," *Gioventú Evangelica*, 1977, IBM RSU archive; Gruppo di Studio IBM, ed., *Capitale Imperialistico e Proletariato Moderno* (Edizioni Sapere, 1971).

472 Bogo and Toloni, "Il Consiglio Di Fabbrica IBM Dal 1969 Ad Oggi."

today" was a history of workers movements at IBM. It situated the 1968-69 protests and the establishment of the Study Group as the founding moments of real workers' struggles in the company. These early discussions were the catalyst for the rise of a small but committed group of workers unionists: in 1972, unionists from CGIL-FIOM, CISL-FIM, and UIL-UILM established the IBM Factory Council (CdF) and RSA, after the Internal Committee ended its mandate and was not renewed.[473]

In the 1970s and 1980s, the IBM Factory Council established itself as a small but committed presence in the company. This was a period of huge growth for IBM Italia, which in the early 1990s counted more than ten thousand employees in Italy. Until the early 1990s crisis, IBM workers' status remained privileged. As previously mentioned, two of the major issues for workers at that time, namely negotiating reduced working hours and wage rises, were not relevant to most IBM workers.[474] The percentage of white-collar workers increasingly overtook blue-collar workers. And, because of existing company agreements, most white-collar workers did not have strict working time requirements. IBM applied its own wage increase method based on a very personalized treatment of workers. This method was not entirely clear and labor unionists often requested more transparency.[475] But ultimately, IBM wages were higher than most other companies, thus workers did not have much incentive to demand stricter compliance with national work agreements. And the salary was only one of many benefits that IBM workers enjoyed.[476]

In general, IBM invested a great deal in promoting an image of abundance and prestige: former IBM Italia workers recollected how they would always be accommodated in high-class hotels during business trips, and how training courses for new employees were held in beautiful and luxurious locations.[477] To the workers with a stronger political awareness, all this prestige looked like wastefulness. But this was not the case for the majority of IBM workers, with consequences for labor unions' popularity. The feeling that all employees belonged to one big family run by "Mom IBM" was indeed prevalent among IBM workers,[478] thus labor unions appeared irrelevant to many. Because of this situation, the very first challenge for IBM unionists was to engage with other

473 *Dalla Commissione Interna alle RSA* (1972), IBM Italia RSU archive.
474 IBM Italia RSU interview January 2020.
475 See: Dibattito - Periodico Della s.a.s. FIM CISL IBM, May 1969; IBM RSU, "Trent'anni Di Contrattazione in IBM," 1982, IBM RSU archive.
476 IBM provided integrative healthcare and pension, and services looking after employees' private affairs, such as paying utility bills and renewing car insurance. IBM Italia RSU interview January 2020.
477 Training courses for technicians and representatives were at Rivoltella Del Garda, and in Novedrate for admin personnel. IBM Italia RSU interview January 2020.
478 IBM Italia RSU interview January 2020.

workers. In the 1970s, Italian unions in large industries organized one strike after another, with masses of employees taking part. This did not happen at IBM, although a few strikes were successful.[479]

What motivated people to actually join labor unions was not based on utilitarian criteria, but rather a cultural commitment.[480] Here, the word "cultural" should be seen as having two meanings. First, it was "cultural" in the "cultural belonging" sense, because many workers unionists came from a socialist environment. This aspect is exemplified by many former labor unionists' personal background, and their engagement in leftist political issues alongside the wider Workers Movement.[481] But their commitment was "cultural" also in the sense that they perceived a lack of cultural stimuli in the company.[482] The cultural vivacity reproduced in *Rivista IBM* and other IBM DirCom material was not experienced by IBM unionists. This contradiction is particularly visible in comparison with Olivetti. While Adriano Olivetti set up a library in his company, at IBM it was the labor unions that established this.[483] This double cultural commitment became a catalyst for the re-politicization of computer debates and design.

3.2.2 Debate or Interview? Emotional practices and rational management

Now that I have set the historical and political scene for the emerging IBM labor unions, I discuss how they specifically engaged with the Black Box Entanglement, starting from the macro-political level, the first to be challenged.

The macro-politics of the Black Box Entanglement were experienced, and criticized, by labor unions through the concept of "IBM rationality." This was the tool to achieve the new social order that the company promoted (IBM society). IBM labor unions' main criticism of IBM rationality was outlined in the IBM workers magazine *Dibattito* (Debate), initiated in 1969 in Milan by the Catholic-oriented labor union CISL-FIM.[484] *Dibattito* pointed out how computer narratives

479 IBM unionists had to get creative, for example hanging posters upside-down to attract their colleagues' attention. IBM Italia RSU interview January 2020.
480 This claim and explanation were reported by former IBM unionists - IBM Italia RSU interview January 2020.
481 Most people who actively participated in the union in the 1970s and 1980s came from the political left, either from communist parties like the PCI, the PDUP and Democrazia Proletaria, or the grassroots left - IBM Italia RSU interview January 2020.
482 IBM Italia RSU interview January 2020.
483 Idem.
484 The IBM Study Group (Gds) produced at least one issue in June. The January, March, and May issues were authored by FIM-CISL. The GdS was formed in March and reported they first worked under the guise of the labor unions.

promised an idealized world, only achievable through technological development. But, the unionists also observed, this idealized world also carried a specific set of values, which were being forced upon workers, and would ultimately be extended to society as a whole. By associating these values with US capitalism, IBM labor unionists re-politicized computer debates, particularly the notion of IBM rationality: it was not an "objective" notion, but a politically and historically situated one.

The first issue of *Dibattito* in January 1969 argued that IBM's highly individualized working relationships did everything but democratize the work process. The cultural and moral shift that IBM forced on its workers, and eventually on society, was described by IBM workers as a form of violence. Changes in working relationships demonstrated a wider loss of values caused by capitalism and consumerism, as these ideologies placed too much importance on material goods and individualism: "[The worker's] conscience is violated when the acquisition of new values is imposed upon him through media and marketing strategies. These values correspond to the commercial interests of the dominant class: failing to achieve them would represent in absolute terms the 'failure' of a life."[485]

These arguments performed at once mobilizing and regulating emotional practices. First, they mobilized Working Class Pride against "the IBM master." Ultimately, claimed IBM labor unions, "What is not masterfully hidden authoritarianism, is paternalism: the usual, super American and Borbonic paternalism."[486] This portrait of IBM management evokes the 1960 eulogy on Adriano Olivetti by the Italian Communist Party seen in chapter 2, establishing Technopolitical Resonance with the "Padrone Olivetti" discourse: neither IBM nor Olivetti openly employed "fascist" or "authoritarian" management tactics, but instead controlled the workforce through a form of "American" (IBM) or "neocapitalist" (Olivetti) paternalism. In this sense, I observe, workers saw IBM not only as the warm and reassuring "mom IBM," but also as an autocratic "*pater familias*" with near absolute power over the lives of its children/employees.

Second, *Dibattito* performed a regulating emotional practice by pointing at a "new series of values" being enforced by this paternalist management style. The "new series of values" also carried a new

485 "Si violenta la sua coscienza, imponendogli, attraverso la stampa e la tecnica pubblicitaria, l'acquisizione di una serie di valori, corrispondenti agli interessi commerciali della classe dominante, il mancato raggiungimento dei quali rappresenterebbe in senso assoluto, il 'fallimento' di una vita." "Dibattito - Periodico Della s.a.s. FIM CISL IBM Tolmezzo," January 1969. IBM RSU archive. 2.

486 "Ció che non è autoritarismo abilmente nascosto, è paternalismo, il solito americanissimo e borbonico paternalismo." "Dibattito", January 1969, 7. "Borbonic" means paternalism and old-fashioned ways, and refers to the Bourbon dynasty which ruled Southern Italy until unification.

set of emotions, specifically the Fear of Falling Behind ("failing to achieve [the IBM values] would represent in absolute terms the 'failure' of a life*")*. But these new values, and therefore this fear, were framed in a negative tone: *Dibattito* regulated the "fear of falling behind" IBM as an undesirable emotion, while pointing at Working Class Pride as the appropriate attitude for workers to have. Besides the distinction between desirable/undesirable feelings, the "regulating" aspect of this emotional practice lies in the fact that labor unionists spoke from a self-attributed position of authority, as political actors most entitled to speak for the working class and its interests.

The following issue of *Dibattito* extended these emotional practices to the global arena, pointing at the relationship between IBM, imperialism, underdevelopment, and exploitation. According to IBM labor unionists, imperialism relied on a false narrative extolling the advantages of the capitalist model. The global division of labor, the unionists observed, not only stemmed from economic considerations, but was first and foremost politically informed. Yet, political issues were rendered invisible by the capitalist myth of opulent society, which also relied heavily on a technological myth. The unionists powerfully mobilized mistrust over this myth: "first of all, we are told that technology is a means for man to free himself from the slavery of labor. This goal makes technological progress the true and ultimate goal in our lives. We are told that underdeveloped areas will gradually disappear, or if they are not developed, it is only because they have not reached an adequate degree of technological development. We are told that consumer goods are very useful things, even indispensable, and that with good will (still the myth of the 'self-made man'), we will be able to possess them."[487] But, ultimately, none of these promises materialized, according to unionists.

Furthermore, the unionists remarked, more than just the introduction of new values, all these elements were identified as part of a wider cultural shift: "Ultimately, the balance of this society is ensured by the diffusion of a specific CULTURE, that is, a specific world view: ideas, hopes, prejudices, ideals, goals, modes of action, a value scale."[488] And in this value scale "there is money or success on top, all the rest is subordinate. The average Western citizen in reality does believe that

487 "Anzitutto ci viene detto che la tecnologia è un mezzo mediante il quale l'uomo potrá liberarsi dalla schiavitú del lavoro; questo obiettivo fa diventare il progresso tecnologico il fine vero e ultimo della nostra vita. Ci viene detto che le aree di sottosviluppo gradatamente scompariranno e se sono ancora cosí è solo perché non si è arrivati a un adeguato grado di sviluppo tecnologico. Ci viene detto che i beni di consumo sono tutte cose utilissime, anzi indispensabili e che con la buona volontá (c'è ancora il mito dell'uomo che 'si è fatto da se') si puó riuscire a possederli." "Dibattito - Periodico Della s.a.s. FIM CISL IBM Tolmezzo," March 1969, IBM RSU archive.

488 "Infine l'equilibrio di questa societá è assicurato dalla diffusione di una CULTURA, cioè di una spiegazione del mondo: idee, speranze, pregiudizi, ideali, scopi, modelli d'azione, una scala di valori." Dibattito, March 1969. Capitalization in original.

money is more valuable than a gift, even though he calls himself a Christian."[489] This reference to Christianity performed again a regulating emotional practice: it was not appropriate for a good Christian to be enthusiastic about the material rewards and individual achievements that IBM rationality promised, the quote implied.

Besides performing their own emotional practices, IBM labor unions also recognized (and criticized) the emotional practices IBM management performed, such as the above mentioned Fear of Falling Behind. Labor unions frequently pointed out that, behind the image of a work environment based on "openness," IBM often mobilized emotions, and particularly fear, to enforce its "rational" management style. This could be seen in the open anti-labor unions behavior,[490] but also in the use of specific management tools employing fear to force adherence to IBM ideology. The practice of the manager-employee "interview," as recalled by Losi in *L'Erba Voglio*, was a key tool used by IBM to force its organizational culture, and thus its political and cultural values, on workers. Unionists argued that, by generating an emotional ambivalence in employees, the interview was a tool for individualizing working relationships, which would be of no benefit to employees in the long run. According to the unionists, the IBM interview fostered the individualization of working relationships without addressing the power inequalities embedded in these relationships: thus the interview was an opportunity to scare workers away from political engagement, and de-politicize working relationships.

The IBM interview was criticized in the first issue of *Dibattito*, then again in the June 1969 issue. The June edition is particularly noteworthy because it published a fictional "interview," mocking the practice of individual manager-employee interviews. Furthermore, this issue was endorsed by the IBM Study Group, not by CISL-FIM like the others. The fictional interview performed two interconnected mobilizing emotional practices. On the surface, *Dibattito* mobilized amusement, capturing the potential reader's attention by providing a light, humorous text. This mock IBM interview was presented ironically as if it had been retrieved from a safety box with a CIA stamp and "DANGER" written on it. But the underlying message contained a clear accusation against IBM management practices, which implicitly mobilized Working Class Pride (and therefore

489 "In questa scala di valori in cima ci sta il denaro o il successo, il resto è tutto subordinato. Il medio cittadino occidentale anche quando si dichiara cristiano, in realtá crede che il denaro vale piú del dono." Dibattito, March 1969.

490 Most of the reported anti trade unions activities were in the 1970s, including boycotting workers protests, firing or otherwise retaliating against strikers, using intimidation and pressure against politically engaged workers. In June 1970, workers were threatened with disciplinary procedures for handing out anti-Vietnam War fliers. In 1976, delegates were similarly threatened due to collecting money for a solidarity initiative. See: "Trent'anni Di Contrattazione in IBM," IBM RSU archive.

unionization) as the only way to achieve better working conditions. This second mobilizing practice was performed by stressing how IBM management mobilized emotions in the workforce: according to the labor unions, the IBM strategy was to ensure people were motivated so they would not feel exploited. The unionists emphasized the centrality of psychology in managers' training. This not only served to motivate workers, but also make them afraid: "did you know that some of these courses use psychology, in its possible applications to human resources management, to better motivate you, stimulate you, scare you and isolate you from your comrades?"[491] the unionists asked in the fake interview.

Other sources described more explicitly how emotions were, or could be, mobilized in workers during the IBM Interview. Fear was obviously a crucial emotion. In 1971, the labor unions magazine *Controbullone* (Counterbolt) described that during the interview: "the worker is alone. He prepares for an individual judgment (or a clash); in any case, to the iron logic of the organization he will only be able to oppose the fragility of his position, the complicity of his desires, the weakness of his fears."[492] In 1975, IBM labor unionist Paolo Bogo alluded to "the interview" in the magazine *Gioventú Evangelica*. The article focused on the organization of work at IBM, on the phenomenon "proletarization of technicians," and the labor union's role in countering this process. The "interview" was considered a crucial tool to enforce the IBM organizational model, and particularly to individualize working relationships. Bogo observed that: "The moment of the evaluation-interview is the typical moment in which the worker is alone, with his smallness and impotence, in front of the master's organizational machine. His only options are to be squashed or to be persuaded."[493] Ultimately, IBM's individualized management style produced a situation where the worker: "will always be subjected to discrimination, to intimidation, to blackmail, and he will always be afraid to stand up for his rights."[494]

491 "Sapevi che alcuni di questi corsi prevedono l'uso della psicologia, nelle sue possibili applicazioni agli aspetti del trattamento del personale, per meglio motivarti, stimolarti, spaventarti e isolarti dagli altri tuoi compagni?" "Dibattito - Periodico a Cura Del Gruppo Di Studio IBM," July 1969, IBM RSU archive.

492 "Il lavoratore è solo. Si prepara a un giudizio (o ad uno scontro) individuale; egli alla logica di ferro dell'organizzazione in ogni caso non potrá opporre se non la fragilitá della sua posizione, la complicitá dei suoi desideri, la debolezza delle sue paure." "Controbullone - Giornale Dei Lavoratori IBM," July 1971, IBM RSU archive.

493 "Il momento della valutazione-intervista è il tipico momento in cui il lavoratore è solo, con la sua piccolezza e impotenza, di fronte alla macchina organizzativa del padrone e allora non gli resta o di venire schiacciato o di venire convinto." Paolo Bogo, "Lavoro e Capitale Monopolistico - Da Che Parte Stanno Gli Impiegati?," *Gioventú Evangelica*, 1975, IBM RSU archive.

494 "sará sempre soggetto alla discriminazione, all'intimidazione, al ricatto e avrá sempre paura di muoversi per far valere i suoi diritti." Bogo, 7.

Another argument the labor unions used against the IBM interview was that it treated IBM rationality as a "natural" aspect of human life. Unionists pointed out that the "fear of falling behind" the graces of IBM management was more than a work concern. It also implied "falling behind" IBM society, a "natural" societal organization that industrialized nations leaned towards (according to IBM). The 1971 issue of *Controbullone*, for instance, argued that the allegedly objective notion of "meritocracy," which the "interview" relied on, was a mystification of privilege and discrimination: "'it is like this because it is natural (hence right) to be like this,' as if people's destiny from birth was to be a punch-card operator or a stoker. Capitalism's interests are smuggled in as being the 'natural order of things,' and the mental pollution produced by capital as 'natural tendencies of the human soul.'"[495] Instead of promoting and encouraging workers' independence, the "interview" served to reinforce existing social hierarchies, and de-politicize them: the emotional helplessness felt by workers was a "natural" feeling, after all, and not the result of a power imbalance.

A similar argument was put forward again in 1980, in a fake, ironic issue of the company magazine *Notizie IBM* (IBM news). The focus here was on how the IBM Interview used "seduction" instead of "coercion" to control the workforce. However, the authors pointed out this seduction was not entirely successful in persuading workers. Workers perceived that IBM claims were not based on a "natural" order of things, and this perception fostered ambivalent emotions. According to the unionists, this awareness also existed outside IBM. They established a parallel between the emotional experience of a worker subjected to the IBM interview and that of a person subjected to IBM society: "certainly, the illnesses that we find today such as nervousness, emotive instability, uncertainty, fear, and loss of identity, which can sometimes become real illnesses, cannot be detached from the adaptation efforts imposed by integration in companies and societies, which try to bind men to their utilitarian needs."[496]

These examples reflected on the macro-politics of discourse animating the Black Box Entanglement, and showed that the road towards a de-politicized IBM society was actually not as smooth as planned. IBM's efforts to enforce its worldview and organizational culture produced

495 "È cosí perché è naturale (e quindi giusto) che sia cosí", come se si nascesse col destino di perforatrice o fuochista. Gli interessi del capitale vengono contrabbandati come "ordine naturale delle cose", e l'inquinamento mentale prodotto dal capitale come "tendenze naturali dell'animo umano." "Controbullone - Giornale Dei Lavoratori IBM," 1971, IBM RSU archive.

496 "Certamente i malesseri che spesso oggi si riscontrano come nervosismo, instabilitá emotiva, insicurezza, paura, perdita d'identitá, che possono a volte essere la causa di malattie vere e proprie, non possono essere scollegati con gli sforzi di adattamento che vengono imposti dall'integrazione in aziende e societá che cercano di ingabbiare l'uomo all'interno delle loro esigenze utilitaristiche." "Notizie IBM (Fake)," 1980, IBM RSU archive.

ambivalent emotional experiences in some workers, as they recognized there was nothing “natural” in IBM rationality. On the contrary, IBM labor unionists stressed that IBM rationality was an eminently political construct, informed by the values and goals of US capitalism. When it came to working relationships, IBM rationality consisted of finding clever ways to avoid workers’ complaints and protests, such as the worker-manager interview. On the one hand, this “rationality” was certainly useful to prevent workers strikes and blockades which could hinder production. But, on the other hand, this same “rationality” was not necessarily beneficial for the expanding computer know-how in Italy. IBM Italia labor unions seemed to be much more committed than IBM management to fostering local R&D investments.

3.2.3 Challenging the micro-politics of the Black Box Entanglement: the struggle over research centers

From the mid-1970s, IBM labor unions increasingly directed their criticism at the lack of proper IBM R&D investments in Italy, thus countering the Technopolitical Resonance of the Black Box Entanglement on the micro-political level. IBM unionists were not alone in this criticism: there was a close relationship between computer company workers in the Milan area. Labor unions at IBM, Honeywell, and Amdahl, all asked their employers for a more serious commitment to promoting technological innovation in Italy.[497]

These historical debates on R&D show how the micro-politics informing computer production at IBM were a frequent source of conflict between its management and its labor unions. Initially, the labor unions pointed out that the lack of a full production cycle meant no real technical know-how was being shared in Italy. Then, when computer systems became more complex, the labor unions stressed how the transmission of technological know-how had become even more scarce, as it was brought to Italy as “closed” or “black” boxes. Consequently, IBM labor unions called for a re-politicization of computer design processes at IBM.

Two emotional practices helped to weaken the Technopolitical Resonance of the Black Box Entanglement in this conflict, and therefore encouraged re-politicization. Requests for increased R&D investments were, first and foremost, framed within the usual workers-masters conflicting relationship, typical of the Workers Movement. From this perspective, all these requests were accompanied more or less directly by the mobilization of Working Class Pride. But, by asking for

497 IBM Italia RSU interview January 2020.

increased R&D investments, IBM labor unions also mobilized Scientific Curiosity, thus diverging from large parts of the Workers Movement that focused more significantly on the negative implications of computer technologies.

IBM unionists frequently discussed that IBM rationality, far from promoting technological know-how sharing, was actually based on a strict division of production among the various local branches. This model gave local branches very fragmented knowledge of the production process. Furthermore, unionists pointed out that the company's investment policy was not really meant to improve local expertise and development. IBM had significant revenue from computer sales in Italy, but invested only a small percentage of this profit in national R&D activities. This was a political choice, not an economic one, the unions claimed.

In March 1974, the labor unions bulletin *Notiziaro per i lavoratori della IBM* (News for IBM workers) published a proposal for a "company platform" (piattaforma aziendale), a sort of negotiation between the company and the unions. The proposal pointed out that Italian plants were only assembling pieces produced elsewhere, thus not receiving any real know-how on the computer manufacturing process. In 1975 this theme was further developed in a labor dispute (vertenza),[498] also specifically mentioning R&D. Italy was compared to France, where there was a complete production line, making both the hardware and the software for the System 3750. In contrast, in Italy the software was only installed and tested. Furthermore, unionists pointed out that the research centers opened in 1969 in Pisa, Venice, and Bari were more like marketing operations than actual research units.

The following year, 1976, IBM labor unions organized a "production conference" (conferenza di produzione) when they further reflected on the causes and implications of the IBM investment policy. This conference offered interesting insights on software and openly called out the micro-politics of the Black Box Entanglement. Unionists observed that investing in a local software center would not be very expensive: IBM just chose not to do it, because the lack of public investments in R&D by the Italian government meant that there was no real competitor in the country.[499] Furthermore, the sharing of technical know-how about software was even more limited in the latest IBM applications. This was the case with the brand-new SNA (system network architecture). Labor

498 IBM RSU, "Vertenza IBM: Occupazione, Organizzazione Del Lavoro, Premio Di Produzione, Diritti Sindacali," 1975, IBM RSU archive; *Notizie IBM*, Decembre 1975, IBM RSU Archive.

499 When useful, IBM used public money. In 1974, it received funds from Cassa del Mezzogiorno to open a new plant in Pomezia, to raise employment. This never happened, and in 1976/7 the trade unions wanted an explanation. See: "Notiziario per i Lavoratori Della IBM," August 1977, IBM RSU archive.

unionists observed: “we are looking at software ‘closed boxes’ (which after some years are added and integrated with the hardware). Their functioning logic is impenetrable and their maintenance is restricted to the labs that developed them and which obviously are not in Italy: the industries which use these products will always be bound to IBM USA.”[500] This claim significantly challenged the Black Box entanglement’s micro-politics, by remarking how the actual functioning of IBM hardware and software was not accessible, not even to the local branches of the company.

In 1977, these debates were brought to the public’s attention,[501] following efforts to renew the Integrative Company Agreement (Contratto Integrativo Aziendale). In February, IBM trade unions organized a conference in Vimercate (Milan), the “National IBM Conference for Employment and Investments.” Local sections of the three main political parties were invited, as well as FLM (metal workers) representatives. This conference was soon followed by a labor dispute, asking IBM for greater investment of its profits in Italy, particularly in research. At the time, IBM had only three research centers employing 50 people, a ridiculously low percentage of its total Italian workforce.

Labor unions magazine *Controbit* reported that in the days after the February conference, IBM management asked some workers to set up a new group for “the development of software products.”[502] However the group’s tasks were not clear, and they were working anyway with the “closed box” SNA. *Controbit* stressed again that this technology was “a set of products, both hardware and software, which are defined as a ‘black box’: this means they are imported to Italy as a ‘closed box.’ There are no diagrams for the hardware and no lists of programs for the software. For security reasons, IBM says.”[503] *Controbit* defined the SNA as “a product which, for the first time, was completely imported in Italy as a ‘black box’ with a technological know-how level equal to zero.”[504] Once again, unionists harshly criticized that IBM Italia workers had no idea how the new system worked, to the point that even its maintenance had to be performed in the USA. The only task entrusted to the Italian SNA programmers was developing interfaces for clients, a rather low-level job given the system’s complexity and potential.

500 “Siamo di fronte a ‘scatole chiuse’ di tipo software (che a distanza d alcuni anni si aggiungono e si integrano a quelle hardware) la cui logica di fnzionamento è impenetrabile e la loro manutenzione è riservata ai laboratori che le hanno sviluppate e che ovviamente non sono in Italia: le industrie che useranno tali prodotti saranno legate a doppio filo alla IBM USA.” “Contributo Del C.d.F. Di Milano Alla Conferenza Di Produzione,” December 1976, IBM RSU archive.

501 The labor unions magazine reported on many issues in articles that were then published in the national press.

502 “Il Controbit,” April 1977, IBM RSU archive.

503 “È un complesso di prodotti, sia hardware che software, definiti ‘black box’: vengono cioè importati in Italia a ‘scatola chiusa’; di questi prodotti, per la parte Hardware non esistono schemi e per la parte software non esistono liste di programmi. Per motivi di sicurezza, dice la IBM.” “Il Controbit,” April 1977.

504 “Un prodotto che per la prima volta in Italia è stato completamente importato a ‘scatola chiusa’ con il livello di conoscenza tecnologica zero.” “Il Controbit.”

In June 1977, the February conference attendees signed a document supporting the IBM labor unions' petition.[505] Their stance on R&D was clear: IBM was asked to complete a full production cycle in Italy, and increase its R&D investments, making them proportional to its revenues. The document was subscribed by the local sections of the Christian Democracy, Italian Communist Party, Italian Socialist Party, and Proletarian Democracy, together with the IBM Factory Council and the Federation of Metal Workers (FLM). However, IBM did not make any concessions, also backed by Assolombarda, the organization of industrialists in Lombardy.[506] This document is interesting because it reveals the paradoxes in Italian computer debates. First of all, the Christian Democracy was the governing party: its political power should have been much more significant than just signing a labor union petition. If they wanted to seriously address the situation, they were certainly in a power position to do so (or at least try). Second, left-wing political organizations like the Italian Communist Party, Proletarian Democracy, and to a certain extent the Federation of Metal Workers, signed a document declaring "not being against" the presence of multinational companies in Italy, thus committing to a quite remarkable ideological profanity. Third, the local industrialist organization chose to support a multinational company's modest R&D commitment, rather than the local political and productive forces demanding more investment. But, if IBM's claims were true, computers should have brought generalized benefits to the entire industrial and economic sector: the interests of Italian industrialists should have been more in line with the labor union requests for more R&D investment, rather than back IBM's weak concessions.

In November of the same year, IBM management circulated in the Vimercate plant a document about its recent withdrawal from India. The document explained that, after a two-year long quarrel with the Indian government, which was demanding more investment, IBM had decided to cease operations in that country.[507] This was a not-so-subtle mobilization of Fear of Falling Behind, against the re-politicization encouraged by the labor unions. The document's underlying message was: "if you don't stop asking to know more about our black boxes, we will leave the country like we did in India when they made similar requests." Needless to say, the company's presence was fundamental for not falling behind the computer society. Workers unions, however, were not impressed by the threat, and objected that laws regulating multinational investments of local profits

505 See: IBM RSU, "Notiziario per i Lavoratori Della IBM."
506 Similar to Confindustria but on a regional level.
507 On IBM in India see: Vaidyeswaran Rajaraman, "History of Computing in India: 1955-2010," *IEEE Annals of the History of Computing* 37, no. 1 (2015): 24–35; Ramesh Subramanian, "Technology Policy and National Identity: The Microcomputer Comes to India," *IEEE Annals of the History of Computing* 36, no. 3 (2014): 19–29.

existed in other Western countries, “and IBM never made a scandal out of that.”[508] Which is to say: the choice to not increase R&D investments in Italy was a political decision by IBM.

Despite their commitment to have IBM open its black boxed computers, the labor union’s actual power in the matter was limited. In December, more negotiations took place between the unions and IBM. The labor unions were very displeased with the results: IBM and Assolombarda conceded some R&D investment to develop small software projects, but refused to change the Scientific Centers operations or engage in any significant research project.[509] In January 1978, a new company agreement was finally signed, and the workers were promised more investments in the Scientific Centers. However, by June 28 that same year, the Scientific Centers’ workers went on strike: IBM was not respecting the agreements and the employment rate was dropping instead of increasing. Furthermore, management was threatening to transfer all the Scientific Centers to Rome.[510]

In March 1979, IBM labor unions published a document questioning IBM’s productivity in Italy, observing again that the company increasingly gave Italians black-boxed computers, “only to be used.”[511] In the same year, as the labor unions had anticipated, IBM closed the Bari and Venice research centers, and opened a new, centralized Software Development Center in Rome. After this final move by IBM, the requests for more R&D investments seemed to quieten down, even though scientific center employees occasionally pointed out the continuing problems with IBM R&D commitment.[512] The early 1980s saw the configuration for that decade: two scientific centers, the old one in Pisa, and the new one plus the Software Development Center in Rome.

Although not very successful, the IBM labor unions’ struggle to achieve more R&D investments was a significant attempt at weakening the Technopolitical Resonance of the Black Box Entanglement. If anything, the unionists confirmed that IBM society would not overcome the existing global division of labor, and that technological gaps between countries would remain. In this sense, Fear of Falling Behind the IBM society was an even less credible concern: someone would always be left behind, first and foremost by IBM.

508 IBM RSU, “La IBM in India,” November 1977, IBM RSU archive.
509 “Notiziario per i Lavoratori Della IBM - Speciale Trattativa 5/6 Dicembre,” December 12, 1977, IBM RSU archive.
510 “Il Controbit,” August 1978, IBM RSU archive.
511 “IBM: Quale Presenza Oggi in Italia?,” March 1979, IBM RSU archive.
512 “Ricerca e Sviluppo Nella IBM,” September 28, 1981, IBM RSU archive.

3.2.4 International solidarity and global crisis: the Black box Entanglement and IBM restructuring

From the mid-1980s, the Italian discontent with IBM R&D investments, as many of the other challenges faced by IBM Italia labor unions, went global. In 1984 a new organization was set up, with the name IBM Workers International Solidarity (IWIS). It was an international organization of IBM labor unions, which from that year met annually or bi-annually until 1992.[513] The first IWIS conference was held in Tokyo in May 1984. Delegates from France, Greece, Italy, Sweden, the USA and Japan were present. The Tokyo conference was followed by Athens (1985), New Orleans (1987), Paris (1989), Rome (1991) and Sindelfingen, Germany (1992). After the first meeting, more countries joined the original group, sometimes discontinuously: Germany, Portugal, the Netherlands, South Korea, Austria.[514]

All these labor unions could be very different, and this diversity made it difficult to plan joint actions and campaigns. For example, the Italian unions' political and societal influence was so strong that even small groups like IBM Italia unions could organize successful strikes when no worker showed up for work (or was allowed to enter). On the other hand, one US delegate participated under a pseudonym because his union had not been officially recognized by IBM:[515] Italian unionists only discovered his real name in the 1990s.[516]

More importantly, IWIS presented a unique opportunity to analyze common problems and discuss the future of IBM. At IWIS meetings, emotional practices countering the Technopolitical Resonance of the Black Box Entanglement were performed in a transnational arena, fostering a re-politicization on the micro and macro-political level. These practices could be seen in the final declaration signed by the participating unions at the end of each conference, and largely coincide with the ones discussed so far. IWIS participants highlighted the mobilization of emotions, particularly fear, by IBM management against the workforce. They also mobilized transnational Working Class Pride to counter it, exemplified by the calls for workers' solidarity and cooperation between unions.[517]

513 When the EU established European Workers Councils (EWC) in 1994, IWIS meetings stopped, as European labor unions created an IBM EWC. IWIS continued, however, and in 2000 famously organized political initiatives on the digital platform "Second Life." See: Bruce Robinson, "Solidarity across Cyberspace: Internet Campaigning, Labour Activism and the Remaking of Trade Union Internationalism," *Work Organisation, Labour and Globalisation* 2, no. 1 (2008): 152–64.

514 IWIS reports, IBM Italia RSU archive.

515 Two US unions were present: the recognized National Black Workers Alliance (NBWA) and the unrecognized IBM Workers United (IBM/WU).

516 IBM Italia RSU interview January 2020.

517 See the first and fourth IWIS declarations, IBM RSU archive.

Finally, the request for increased R&D investments mobilized again Scientific Curiosity. IWIS meetings showed that there was Technopolitical Resonance among the various IBM branches, but also among the various IBM labor unions.

The first IWIS conferences were held in a period of relative stability for IBM, and generated typical union requests. IWIS participants reported how IBM management mobilized fear to control the workforce. In the final declarations after the Tokyo and Athens conferences, IWIS participants harshly criticized IBM's union-busting activities. They reported that labor unionists in all the various countries faced repercussions for their political activity, and workers were often scared into not joining the union. IWIS participants also mobilized Scientific Curiosity. Another aspect stressed at the first two IWIS conferences was IBM's lack of proper local R&D investment. Even countries that received much more research funding compared to Italy were dissatisfied. At the first IWIS conference, labor unions committed to increase the technological know-how sharing in every country, fostering a better integration of IBM in local economies. The second IWIS declaration again asked IBM "to contribute in a more specific and permanent way to the economies of the countries in which it operates."

Later IWIS developments happened in parallel with IBM's global crisis. For this reason, a transnational discussion forum such as IWIS was particularly relevant, because unionists could gain additional information on the unfolding IBM crisis. The New Orleans conference, held in April 1987, marked a shift in the concerns and needs expressed by IBM labor unions. The IBM crisis was unfolding, and the final declaration explicitly showed the unionists' apprehension: "IBM Management is preparing its strategy to face the current difficulties. IBM employees have no information and are worried about full employment, work transfers, and the future more in general."[518] At the fourth conference (Paris 1989), the global IBM crisis was the main theme of debate. The first point in the Paris final declaration was particularly unforgiving towards IBM, stating that the company had actually no respect for individuals, contrary to what it claimed was one of its founding principles. IWIS participants mobilized Working Class Pride, as they harshly criticized deregulation, the forced competition between European branches, plus the downsizing and closures of offices and production plants. Similar discourses were heard at the following IWIS

518 "La Direzione IBM sta preparando la sua strategia per fare fronte alle difficolta' attuali. I dipendenti IBM non hanno informazioni e sono preoccupati per quanto riguarda la piena occupazione, I trasferimenti e il futuro in generale." IBM Workers International Solidarity, "IWIS New Orleans Final Declaration," April 1987, IBM RSU archive.

conference in Rome, when labor unions shared their experiences of the company's global reorganization.

These discussions were relevant for IBM Italia's labor unions: by participating in IWIS conferences, they increased their awareness of the global IBM situation, realizing that something was happening before the 1990s massive redundancies.[519] From the late 1980s, IBM Italia labor unions were warning their colleagues about the potentially negative consequences of the IBM crisis for its personnel. In 1987, Italian unions shared with their Italian colleagues a German IBM management document circulating during the IWIS conference, stating that the objective for the future was to keep doing the same job with fewer people.[520] The unions shared this news through workers assemblies and in labor unions communications, but they were mostly unheard. According to former IBM unionists, the majority of IBM employees, usually uninterested in labor union activities, could not believe that "Mom IBM" was betraying them—or, in other words, that they too could be allowed to "fall behind" notwithstanding their enduring allegiance and trust in the company.

But in the end, they did fall behind. In the 1990s, especially after 1993, thousands of people were laid off by IBM Italia: of the more than 12,000 people working at IBM in 1990, only half were left by 2000.[521] In some cases entire IBM Italia sectors were sold to other companies, and so employees passed from one company to another. But many IBM offices around the country were closed for good. After the first wave of massive lay-offs, IBM Italia employees increasingly turned to the labor unions. However, not much could be done besides negotiating favorable exit conditions.

The IBM crisis and its global restructuring, highlighted the crucial outcomes of the Black Box Entanglement in Italy. On the macro-political level, the IBM promise of endless prosperity was questioned, together with its "rational" management style. IBM employees found out that, once a manager was obliged to dismiss and not to listen, there was no "open door"[522] for workers to get better conditions. On the micro-political level, the IBM crisis confirmed how little importance the company attached to R&D in Italy. The already limited research activities were the first to be

519 IBM Italia RSU interview January 2020.
520 "Il Vero Volto Di IBM," June 1, 1987, IBM RSU archive.
521 "Presenza IBM in Italia (1991-20…)", IBM RSU archive.
522 The "open door policy," a main human resources practice at IBM, meant that an employee could discuss a problem anytime with their manager, whose office door was ideally always open.

further reduced. In 1992, the last standing research center in Pisa was shut down, followed by a further centralization of all research activities in Rome.[523]

Yet, IBM Italia labor unions' experience also shows that these processes were not left unchallenged. By mobilizing Working Class Pride and Scientific Curiosity, unionists tried to re-politicize computer debates and design within IBM. Although the most ambitious struggles, such as for increased R&D investments, did not succeed, unionists still managed to provide a counterweight to the Technopolitical Resonance of the Black Box Entanglement. The fact that this counterweight existed, I argue, was in itself significant because it proved that IBM rationality was an avoidable destiny. Once again: not all "IBM men" were like "The IBM man."

523 "Centri Scientifici IBM: Continua La Provocazione," 1992, IBM RSU archive.

3.3 "The armed party" and the Black Box Entanglement

To conclude my examination of the historical relationships between the Black Box Entanglement, IBM and Italian socialist politics, another group of unusual "IBM men" enter the stage. Or rather, make their second entrance. As mentioned, the IBM Factory Council stemmed from a Study Group (Gruppo di Studio, GdS), established during the Italian Workers Movement's revitalization in 1969. But there is also another history of the IBM Study Group, tied to a much harsher critique of IBM than the labor unionists produced. This history also intersects with the genesis of the "armed party," the name used by historian and political scientist Giorgio Galli, to identify the left-wing, armed revolutionary groups which populated 1970s and 1980s Italian politics.[524]

The history of the IBM Study Group is therefore an entry point to investigate the genesis of so-called "anti-technology" positions within the Italian left, and their connection with left-wing politically informed violence. These two elements (politically informed violence and resistance to technology) are often described as being in a causal relationship mediated by fear, exemplified by the definition of "computerphobia" discussed in chapter 1: if you burn an IBM punched card during a political demonstration, it means you are afraid of computers. Yet, as we saw in chapter 1, the story is often more complex. Investigating this relationship is even more important in the Italian context, where post-WWII left-wing political violence has been a significant and much studied phenomenon.[525]

The IBM Study Group mobilized Class Hatred in the field of computer production, through a series of publications on IBM organizational politics. The Study Group initially encouraged a re-

524 Giorgio Galli, *Storia Del Partito Armato*.

525 Literature on the armed party falls into three groups: 1) accounts by politicians, judges, and journalists, often personally involved in the institutional handling of the armed party (on the State's side). These are based on judicial evidence, and contain the authors' personal conjectures: Sergio Flamigni, *La Sfinge Delle Brigate Rosse. Delitti, Segreti e Bugie Del Capo Terrorista Mario Moretti* (Kaos Edizioni, 2004); Carlo Mastelloni, *Cuore Di Stato* (Mondadori, 2017); 2) Books written by or together with former armed party members, such as personal accounts: Barbara Balzerani, *Compagna Luna* (Feltrinelli Editore, 1998); Adriana Faranda, *Il Volo Della Farfalla* (Rizzoli, 2006); or interviews: Mario Moretti, Rossana Rossanda, and Carla Mosca, *Brigate rosse. Una storia italiana* (Mondadori, 2007); Renato Curcio and Mario Scialoja, *A Viso Aperto* (Mondadori, 1993); Giovanni Fasanella and Alberto Franceschini, *Che Cosa Sono Le BR. Le Radici, La Nascita, La Storia, Il Presente* (BUR, 2004). Such books provide an "internalist" perspective on armed struggle, with all its limitations and advantages. 3) "traditional" scholarship. I relied on works by historian and political scientist Giorgio Galli, sociologist and political scientist Donatella Della Porta, and historian Andrea Saccoman. Galli is a long-time scholar of Italian politics, and his work is particularly useful for understanding the genesis of political violence within Italian Marxism, see Galli, *Storia del Partito Armato*. Della Porta is a renowned scholar in social movements, and has conducted extensive studies on left-wing political violence as a sociological phenomenon, providing important data and insights. Della Porta, *Il terrorismo di sinistra*, Ricerche e studi sul terrorismo e la violenza politica (Bologna: Il mulino, 1990); and *Social Movements, Political Violence, and the State: A Comparative Analysis of Italy and Germany* (Cambridge University Press, 2006); Saccoman has produced extensive works on the early years of the Red Brigades, a period which interests me most. Saccoman, *Sentieri Rossi Nella Metropoli: Per Una Storia Delle Brigate Rosse a Milano* (Cuem, 2007).

politicization of computer debates by critically addressing the Black Box Entanglement's macro-politics. But they also performed a total identification of IBM macro-politics with its micro-politics. In the long run, this resulted in failing to analyze the actual functioning of computers, thereby often exaggerating their power, both inside and outside the armed party. Such attitudes, I argue, ultimately amplified the Technopolitical Resonance of the Black Box Entanglement, fostering a de-politicization of computer debates on the micro-political level. In the specific case of the armed party, this de-politicization resulted from the combination of Class Hatred with Revolutionary Fear and Trust mobilized through political violence.

3.3.1 "IBM Produces War." The other history of the IBM Study Group

As explained by IBM unionists Paolo Bogo and Giancarlo Toloni, early debates in the IBM Study Group were informed by two main arguments.[526] First, the connection between anti-capitalism and anti-imperialism, resulting in the idea that capitalist multinationals such as IBM inevitably brought to the "proletarization of all the workers." Second, the idea of living in a pre-revolutionary historical phase. For this reason, the IBM Study Group initially focused on increasing the politicization of already politicized workers, in order to establish a vanguard to lead class struggles at IBM. Bogo and Toloni noted, however, that this strategy failed to engage other IBM workers. Some Study Group members eventually realized that a small group of committed workers was not enough to stimulate class consciousness in the entire company, and therefore revitalized the labor union.

Other members of the IBM Study Group, though, had different views. In their opinion, the Study Group problem was precisely because at some point "it decided to speak with all the workers, thus did not really speak to anyone."[527] Before abandoning the name "Gruppo di Studio IBM" for good, some members published a book with a critical examination of IBM's work organization, and its political implications. The IBM example, they noted, was particularly significant because it united three "fronts of struggle": anti-capitalism, anti-imperialism, and anti-revisionism. These three concepts were the armed party's main ideological pillars. "Anti-capitalism" was of course intended from a Marxist perspective; "anti-imperialism" stressed the global unity of local, anti-capitalist, revolutionary movements; "anti-revisionism" was an accusation levelled at the Italian Communist

526 Bogo and Toloni, "Il Consiglio Di Fabbrica IBM Dal 1969 Ad Oggi."
527 Gruppo di Studio IBM, *Capitale Imperialistico e Proletariato Moderno*. 108.

Party, because it abandoned Marxist-Leninist revolutionary practices opting instead for an "Italian road to socialism" based on participation in institutional parliamentary politics.

The "other history" of the IBM Study Group is in fact intertwined with the armed party genesis, and in particular its most famous exponent, the Red Brigades. On September 8, 1969, leftist political groups from the Milan area formed a new umbrella organization called Metropolitan Political Collective (Collettivo Politico Metropolitano, CPM).[528] The IBM Study Group was among them, alongside other Study Groups from Milan factories, political collectives of workers and students, and individual members. The founders of the Red Brigades were all prominent members of the Metropolitan Political Collective: Renato Curcio, former student at the University of Trento (though he never graduated, a political choice), proponent of the "Manifesto for a negative university" (see chapter 2); Margherita "Mara" Cagol, also a former student of the University of Trento (she did graduate, with a dissertation on Marx's *Grundrisse*), married with Curcio; Alberto Franceschini, former engineering student (like Curcio, he never graduated)[529] and former member of the Italian Communist Party youth section; Mario Moretti, working at electronics company Sit-Siemens as a "technician," which is a highly skilled technical worker, but not necessarily an engineer (Moretti did not have a degree in engineering).

When the Red Brigades were founded in 1970, the IBM Study Group did not join them.[530] According to Franceschini,[531] IBM workers were brought to the Collettivo Politico by Corrado Simioni, another prominent figure in the organization.[532] Franceschini recalled "There were some IBM engineers, all of them under Simioni's wing, they were his flagship. Only later did I understood their importance, and why Corrado was so proud of them: they were the only ones to have access to computers […], and he considered their presence in the organization as a fact of great 'revolutionary modernity'."[533] However, significant disagreements arose between Simioni and

528 Saccoman, *Sentieri Rossi Nella Metropoli*; Marco Clementi, Paolo Persichetti, and Elisa Santalena, *Brigate Rosse: Dalle Fabbriche Alla «campagna Di Primavera»*, vol. 1 (DeriveApprodi, 2017).

529 Curcio completed all his exams and chose not to take the degree; Franceschini did not graduate because he preferred politics to study. Curcio and Scialoja, *A Viso Aperto*; Fasanella and Franceschini, *Che Cosa Sono Le BR.*

530 See: Saccoman, *Sentieri Rossi Nella Metropoli*; Clementi, Persichetti, and Santalena, *Brigate Rosse: Dalle Fabbriche Alla «campagna Di Primavera»*.

531 Reported in Flamigni, *La Sfinge Delle Brigate Rosse. Delitti, Segreti e Bugie Del Capo Terrorista Mario Moretti*.

532 Simioni was a leader in the CPM and Sinistra Proletaria, but when the Red Brigades were formed, he disagreed with other members, and founded his own short-lived group. The Red Brigades mockingly called Simioni's group "Superclan," short for "super clandestine." This implied the group was even more "extreme" than the Red Brigades, at least its discourses. No action was ever officially pinned to the group, except a self-attributed failed attack on the US embassy in Athens. Simioni later moved to Paris, where he founded a language school in 1976.

533 "C'erano alcuni ingegneri dell'Ibm, tutti sotto l'ala di Simioni, erano il suo fiore all'occhiello. Capii dopo la loro importanza e perché Corrado ne fosse così orgoglioso: erano gli unici ad avere accesso ai computer - i calcolatori, come si chiamavano, allora infatti non esistevano ancora i pc -, e considerava la loro presenza nell'organizzazione

future Red Brigades founders Curcio, Cagol, and Franceschini. Once the Red Brigades were established, Simioni had been driven away—and the IBM engineers went with him.

Nonetheless, the IBM Study Group had a role in building the political analysis supplementing the transition from the Metropolitan Political Collective to the Red Brigades. In 1970, the Metropolitan Political Collective decided to found a new, more centralized group called Proletarian Left (Sinistra Proletaria, after the French "Gauche Prolétarienne"),[534] which produced a series of short political documents and a magazine with the group's name (only two issues were published). IBM Study Group members helped produce the magazine, contributing both financially and as editors.[535]

Sinistra Proletaria was organized like a regular magazine: it had an editorial committee, an address and a postal account to receive payments. It was distributed in several Italian cities, also thanks to the network of Feltrinelli bookshops.[536] Yet, its contents, particularly in the second issue, subtly hinted at the need for an armed "proletarian revolution." This was the only way to overcome the forces of "imperialistic capital" that exploited the global proletariat with the complicity of "revisionist" political parties like the Italian Communist Party.

Sinistra Proletaria framed IBM as the most representative example of imperialistic capital. Both magazine issues featured extensive analyses of IBM's work organization, produced by IBM Study Group members.[537] At their core, these analyses were no different from those produced by the IBM labor union, and they presented a powerful critique of the Black Box Entanglement. But between the first and second issue of *Sinistra Proletaria,* a shift in tone and in the scope of analysis could be detected, regarding both the magazine as a whole and the specific articles on IBM. This shift is powerfully exemplified on the magazines' front covers: whereas the first had a picture of Lenin, the second showed an assortment of rifles and other weapons.

The first issue of *Sinistra Proletaria* (July 1970) only had one IBM-themed article, titled: "IBM: technicians or proletarians?"[538] The article described the company's global structure and the work

come un fatto di grande 'modernità rivoluzionaria.'" Fasanella and Franceschini, *Che Cosa Sono Le BR.* 52. Franceschini reported that Simioni showed him a series of graphs and tables made on a computer by IBM engineers, predicting that the crisis of capitalism would happen between 1974 and 1975.

534 Saccoman, *Sentieri Rossi Nella Metropoli*.

535 As reported by Renato Curcio, IBM's generous salaries enabled technicians to make regular financial contributions to *Sinistra Proletaria*. Curcio and Scialoja, *A Viso Aperto*. 34

536 See "elenco distribuzione" in *Sinistra Proletaria (Numero Unico)*, July 1970, 47, and *(1-2)*, October 1970, 55.

537 These analyses appear in a later publication authored just by the IBM Study Group, as discussed later.

538 *Sinistra Proletaria (Numero Unico)*.

being done by the technicians in Vimercate, which was essentially to ensure that IBM head-office orders were being followed. In other words, it pointed out how the micro-politics of computer design at IBM did not foster the sharing of technical skills and know-how. The working class was not disappearing due to computers, the article observed: it was just changing. Technicians were becoming proletarians, as much as their blue-collar colleagues. The article went on to trace the (short) history of the Study Group. This story started by admitting the initial difficulties found in engaging their colleagues at IBM, but ended by mobilizing Working Class Pride, as the Study Group announced that now "The political vanguard is profoundly rooted in the heart of the factory,"[539] although later sources, including Study Group writings, suggest otherwise.[540]

In the second issue (September/October 1970), *Sinistra Proletaria* published a longer report on IBM, expanding some of the themes discussed in the previous issue. The report emphasized two key features of the IBM Study Group perspective that mark their distancing from the IBM labor union: one, an increasing imbalance in favor of the macro-political level of analysis, and consequent failure to engage with the micro-political level; two, the shift from Working Class Pride to Class Hatred as the crucial mobilizing emotional practice used to address the Black Box Entanglement.

The IBM Study Group's report further showed that the micro-politics of computer design at IBM were heavily centralized and hierarchical. This aspect suggested that it was never going to be possible to escape the Black Box Entanglement's micro-politics: some parts of the world would always remain "behind" others in terms of technological know-how. The article warned against thinking that the local branches were actually involved in any decision-making process: there was only one IBM, which operated in Italy under the name "IBM Italia." This could also be seen in the various branches' production interdependence, which meant none of them could be self-sufficient in production terms: the high-level R&D was done in the USA, the mid-level assembly of computers happened in developed countries, and the manufacturing of lower-level components in developing countries. This asymmetrical production organization also went hand in hand with an equally asymmetrical sales organization: developing countries always received obsolete models, while the newer ones were reserved for richer countries. Ultimately, there was not a "sum" of powers, but a "concentration" of powers in IBM's global structure.

539 "L'avanguardia politica e' profondamente radicata nel cuore della fabbrica." *Sinistra Proletaria (Numero Unico)*.
540 Bogo and Toloni, "Il Consiglio Di Fabbrica IBM Dal 1969 Ad Oggi"; Gruppo di Studio IBM, *Capitale Imperialistico e Proletariato Moderno*.

However, the technological gaps voluntarily enforced by IBM seemed a small thing in light of the IBM Study Group's macro-political analysis. According to them, this was World War Three: the war between capitalist imperialism and popular guerrilla warfare. The globalization of "imperialistic capital" was a crucial aspect of this war, and well exemplified by IBM.[541] Technological development was vital— "cybernetics" and "electronics" were described as key weapons in the hands of imperialistic capital. According to IBM Study Group, computers were clearly being used at various levels of the defense apparatus, a *de facto* tool of war though not classified as such. Cybernetics was emphatically associated with the SAGE project, demonstrating the research field's destructive outcomes.

The final section of the report detailed IBM's specific involvement in the US military-industrial complex. This included data on the financing IBM received from the US Department of Defense, and a description of the various ways computers were employed as war tools. This account undoubtedly mobilized fear, by pointing out that a war was going on, and describing the powerful military apparatus employed by "imperialist capital." But *Sinistra Proletaria* did not aim to scare workers: the goal was to persuade them of the necessity, and the possibility, of an armed resistance to global capitalism. Trust was also a crucial emotion, in the sense of "trust in the possibility to make the communist revolution, here and now," a "Revolutionary Trust." The report on IBM was followed by articles about the Uruguayan Tupamaros, resistance movements in Argentina, and the Palestine Liberation Organization. Despite facing constant repression, these movements showed that the global proletarian resistance was fighting, and at times even winning.

Class Hatred was also central in this discourse, because an underlying thread in *Sinistra Proletaria* articles was the creation of a dichotomy between the revolutionary proletariat and its class enemies. The articles on IBM ended with profiles of IBM US board members' personal involvement in war related issues. These personalities were not explicitly called class enemies, though their depiction hardly suggested they were allies of the global proletariat. The first IBM personality introduced was IBM founder Thomas Watson senior, often remembered for focusing his attention on workers and his patriotic spirit. *Sinistra Proletaria* chose instead to recall Thomas Watson Sr.'s very positive declaration about Mussolini in 1930, or when he was awarded a medal by Hitler in 1937, which he only gave back after the outbreak of WWII. The magazine then singled out other IBM figures for their involvement in the Vietnam War, Latin American right-wing coups, and making biological and chemical weapons to use against communist guerrillas.

541 "IBM Produce Guerra," *Sinistra Proletaria*, October 1970, 23-42.

Other articles pointed out how "revisionist" political actors such as the Italian Communist Party and the labor unions were ultimately "slaves to the masters," and therefore no longer allies of the proletariat. A short article "Luigi Calabresi. Tool of the imperialist right" combined Italian fascist bombings, Giuseppe Pinelli's death (Calabresi was considered responsible),[542] and Latin America guerrillas, as part of the same story. Most importantly, *Sinistra Proletaria* observed, "Today it is imperialism that should fear the global proletariat, not the proletariat fear imperialism."[543] The emancipation of the "global proletariat" inevitably had to undergo the elimination of its class enemies. The article concluded "Calabresi is already condemned," in capital letters.

After this second issue of *Sinistra Proletaria*, the IBM Study Group and the Red Brigades (which by then had made their first public appearances) parted ways. The Red Brigades became the third communist revolutionary group established in Italy, after the short-lived October 22 Group (Gruppo XXII Ottobre) and the Partisan Action Groups (Gruppi di Azione Partigiana), also short-lived,[544] founded by publisher Giangiacomo Feltrinelli. Many other armed formations followed, but the Red Brigades were the most active and lasted the longest. Yet, notwithstanding the centrality of IBM in the Red Brigades' formative period, they ignored computers for years. The IBM Study Group published the *Sinistra Proletaria* articles in a book, which became an important reference within the Italian left (not just the "armed" group). Before returning to the armed party, I now discuss the wider cultural legacy of the IBM Study Group's book, because it shows how Class Hatred was mobilized in anti-technology discourses, and the implications for the de/re-politicization of computing.

3.3.2 IBM against the proletariat. Class hatred outside the armed party

In 1971, the IBM Study Group made its final appearance with a book titled *Capitale Imperialistico e Proletariato Moderno* (Imperialistic Capital and Modern Proletariat). This work was first printed in 1971, and again in 1973, by Edizioni Sapere (Milan), and reprinted in 1978 by Nuove Edizioni Operaie (Rome). The book updated the essays published in *Sinistra Proletaria*, including some new material and an appendix with IBM management documents. There was an overlap between the book themes and the labor union themes: IBM's work organization, how it enforced IBM

542 Calabresi was the police commissioner who ordered Pinelli's arrest. He was not present when Pinelli died, but had questioned him, and due to his institutional role, was seen as responsible for Pinelli's death.

543 "Oggi è l'imperialismo che ha paura del proletariato mondiale, e non il proletariato che ha paura dell'imperialismo". *Sinistra Proletaria (1-2)*. 22.

544 The name was a tribute to actual communist partisan groups in the Italian Resistance.

rationality, and how computers helped diffuse this rationality. But the Study Group added a further layer of analysis, which framed these processes in a military perspective. Indeed, the preface commented that some of the original Study Group members would most likely disagree with the book's conclusions. The authors dismissed any disagreement as a "logical consequence" of political struggle.

The Study Group argued that IBM's managerial style served to promote an authoritarian mindset in workers, thereby fostering an overall militarization of society. For example, the "interview" and other IBM management tools[545] were not only meant to make workers feel alone, but also to impose on them a military mindset. The Study Group pointed out, "it is no coincidence that the same techniques to motivate the workforce are used in advanced companies as in high military ranks (NATO, Pentagon etc.). This phenomenon has a profound meaning: the hierarchical and authoritarian structuring of any military organization is nothing more than the synthesis of the general social model produced by capitalism, nothing else than its armed guise."[546]

This was a significant shift in how IBM was portrayed: no longer as a symbol of "American paternalism" identified by the IBM labor unions, and also attributed to Adriano Olivetti, but as a military entity engaged in a war against the global proletariat. This shift called not just for Working Class Pride, but Class Hatred. From the Study Group's perspective, there were only two options: either you were part of the struggling global proletariat, or you were a class enemy. This implied that it was pointless to seek new ways to engage with "bourgeois" institutions. The Students Movement, for example, was proposing a "partial and alternative use" of academic institutions, requesting students' direct involvement in academic management. The IBM Study Group harshly criticized this proposal, on the grounds that academic institutions exclusively produced "bourgeois ideology and science." As the Study Group argued, it was increasingly difficult to find middle-class intellectuals and professionals who could be "culturally autonomous": most were active subjects in the capitalist dominion system, "and thereby, objectively, class enemies."[547]

545 Psychology and behavioral science theories played an important role in management training and human resources operations.

546 "Non è un caso che le stesse tecniche di manutenzione e motivazione vengono usate, oltre che nelle aziende avanzate, anche negli alti comandi militari (NATO, PENTAGONO, ecc…). Questo fenomeo ha un significato profondo: la strutturazione gerarchica e autoritaria tipica di qualsiasi organizzazione militare non è altro che la sintesi del modello generale di societá prodotto dal capitale, non è altro che la sua veste armata." Gruppo di Studio IBM, *Capitale Imperialistico e Proletariato Moderno*. 58.

547 Gruppo di Studio IBM, 55.

The IBM Study Group heavily stressed the relationship between contemporary scientific development and capitalism, thus reinforcing Class Hatred: science was considered the theoretical support of capitalism, technique its practical support, and the computer its material support. In this sense, computers were seen as the primary tools for imposing IBM's military organizational culture on society. The Study Group thereby paved the way for a de-politicization on the micro-political level. In the Study Group's view, the computer was "not a 'product' but only a means, the tool on which the real IBM product relies: organization"[548] (i.e. IBM rationality). They claimed, "the organizational logic of work at IBM overlaps the computer's organizational logic."

Whereas the Study Group's book provided abundant details of IBM work logic, computer logic had a marginal role. Computer functioning was briefly explained at the beginning of the book, but in such general terms that it made computers look useful for fostering any political ideology, not only capitalism. The crucial aspect of the computer's "logic scheme" was that it worked in a hierarchical line, with the political vision coming from above. But what if the political agenda programmed in the computer came from Lenin and not from Thomas Watson? This aspect was left unaddressed. The Study Group remarked on their perplexity when noting that even the Soviet Union Communist Party was heavily investing in cybernetics and electronics. But they only expressed their doubts through an exclamation mark, not a political analysis.[549] The IBM Study Group thus performed a total identification of computing's micro-politics and macro-politics, making it irrelevant to engage with either aspect separately: whatever was true on one side, was also true on the other.

In the 1970s, the contrast between the promises of techno-scientific progress and working class real-life experiences became a central theme in grassroots left debates, further mobilizing Class Hatred. The non-neutrality of science, as introduced in chapter 2, was also a key topic. On the macro-political level, these perspectives fueled a generalized re-politicization of debates on science and technology. But this re-politicization did not always translate into the micro-political level, leading to new "socialist uses" of scientific and technological development. Computers were exemplary in this sense: the Study Group's identification of macro and micro-political aspects remained a constant throughout the decade. Despite all sorts of macro-political implications associated with computers, their actual functioning remained a black-box and the micro-politics of computing were left unaddressed.

548 Idem, 26.

549 The Study Group wrote that computer sciences and cybernetics had their center in the USA, but "they are also quite developed in the USSR (!)" The exclamation mark in parentheses denotes perplexity and surprise. Gruppo di Studio IBM. 38.

The way this de-politicization worked in the wider panorama of the Italian left, is exemplified by two books published in 1973 and in 1977, focusing on the relationship between capitalism and scientific development. These two books, authored by two different collectives under the name Scientific Counterinformation Collective (Collettivo Controinformazione Scienza), belong to the traditions of Workerism and Autonomist Marxism. Both books had a tendency to exaggerate their claims, all the more so when it came to computers. The analysis on other fields of techno-scientific development was sometimes more sophisticated and reliable than the references to computers. This shows that these groups could have been perfectly capable to produce accurate and coherent analyses of computers: they chose to not do so. In this way, they fostered a de-politicization of computer debates on the micro-political level, because they did not engage with the actual functioning of computers: this material aspect was largely marginalized, as in the IBM Study Group's book. When it came to computers' technical possibilities, anything could be true.

The first book, *La scienza contro i proletari* (Science against the proletariat), was first published as a booklet in 1973, then again as an actual book in 1974. It was a collection of quotations from articles and books, with a commentary explaining the links between the quotes, underlining the most urgent political issues they elicited. The authors presented their research questions in the introduction, all related to the political significance of scientific and technological developments. The last question was: "Why are people afraid, and why do they feel extraneous to 'scientific progress'?"[550] And was it unavoidable to feel that way, or was it because this "scientific progress" was a product of the masters, which had nothing to do with the welfare of the workers? The Scientific Counterinformation Collective had no doubts: the second option was the right one. They did not want to "refuse, in principle, scientific development," and rejected the perspective "let's destroy all the machines, the factories and the laboratories, and let's go back to nature."[551] Another type of scientific progress was indeed possible, they specified, as shown by the countries where the proletarians held power, such as China, Vietnam, Albania, Korea.

The book, however, mostly focused on how the "dirty science of the masters" inevitably led to the oppression of the proletariat. Or worse: how science was developed with the specific aim of oppressing the proletariat. Also in this case, the mobilization of Class Hatred often became much

550 "Perché la gente ha paura e si sente estranea al 'progresso scientifico'?" Collettivo controinformazione scienza, *La Scienza Contro i Proletari*, 2nd ed. (Edizioni Savelli, 1974), 12.

551 "Distruggiamo tutte le macchine, le fabbriche e i laboratori e ritorniamo alla natura" Collettivo controinformazione scienza, 12.

more important than Working Class Pride. Computers were briefly mentioned, generally in a very negative light. Computers were a tool to realize "the good old dream of every master: to categorize and to control the whole of humankind,"[552] and they "help the master to better exploit, oppress, and kill us [the proletarians]."[553] Computers' technical vulnerability was actually pointed out, as the Scientific Counterinformation Collective noted that even rudimentary knowledge of these machines showed how easy it was to break them: "some sand, a pair of nylon stockings, chewing gum stuck on the right spot, a magnet, and millions of dollars disappear."[554] But, overall, the discourse mostly concentrated on the worrying macro-political implications of computing, with some classic examples of "fear of computers." Influenced by Vance Packard's popular book, *The Hidden Persuaders*, computers were seen as a crucial tool for the "bio-control" of humans. The Scientific Counterinformation Collective reported, from Packard, a reference to a 1956 article published in *the Times*,[555] discussing some futuristic computerized device which could be implanted in children to control their brains. Other similar references followed, generally quotes from magazines taken out of context, showing how in a not-so-distant future, laboratory-made humans would be produced in series, or their brains could be remotely controlled and manipulated.

But fear was not the end point of these discourses: Class Hatred was. Ultimately, the book concluded, the question was not whether there were "good scientists" and "bad scientists," but: "Where do scientists stand, within the class struggle? Are they with the masters or with the proletarians?" According to the Collettivo, all contemporary science was developed against the proletariat. Therefore, all those who kept doing their scientific research without openly opposing the masters were "enemies of the proletariat, and of the whole humankind."[556] This powerful mobilization of Class Hatred hints at why, in the end, the micro-politics of computing were not so important for the Collective: if computers were the outcome of the "dirty science of the masters," then the proletariat already knew everything it needed to know about them. No hope, no trust, no curiosity, no pride: hate was the most relevant emotion here. This was the same mechanism which prevented the IBM Study Group from engaging with the materiality of IBM computers: if an IBM computer was the same thing as IBM rationality, then a macro-political analysis was sufficient to explain everything.

552 Collettivo controinformazione scienza. 18.
553 Idem, 20.
554 "Un po' di sabbia, un paio di calze da donna di naylon, una gomma americana attaccata nel punto giusto, una calamita, e va in fumo qualche milione di dollari" Collettivo controinformazione scienza. 19.
555 The Times article reprinted a statement about "biocontrol" from electrical engineer Curtiss R. Schafer, originally made during the National Electronics Conference in Chicago, 1956. See: Vance Packard, *The Hidden Persuaders* (Ig Publishing, 2007), 220.
556 Collettivo controinformazione scienza, *La Scienza Contro i Proletari*, 118.

The second book, *Kapitale e/o Scienza* (Kapital and/or Science)[557] was published around 1977[558] by the Scientific Counterinformation Collective in Brescia (a city in Northern Italy, in a heavily industrialized area). Although this book contained a lengthier introduction, the structure was similar to the first, with many references from published works, in some cases the same as in the 1973 book. Computers were mentioned, but again briefly. *Kapitale e/o Scienza* discussed the same concerning aspects of computers identified in the previous book, using the same sources, including the 1956 Times article, which had become even more anachronistic. The work by the IBM Study Group was referenced in the bibliography,[559] but not directly quoted.

This book powerfully exemplifies how the de-politicization of computer debates continually occurred in the 1970s. The rapid growth in the computer sector makes it hard to believe that in 1977 there was nothing new to say on computers compared to 1973. The IBM Study Group book was not the only Marxist analysis of computer politics published in Italy by that year. But no further references were added.

The final section of the book included a dissenting perspective, by the Autonomist from the Radio Alice group in Bologna, which I discuss in chapter 5. The piece was titled “From the criticism of science to the critical science for freedom”, and mobilized hope in the fact that a human-centered, socialist use of technology was possible, and useful, in the here and now. Which is to say, it mobilized the Principle of Hopeful Curiosity. According to Radio Alice, the re-appropriation of technology was not a future, vague possibility: “The transition from criticism, to science, to critical science is complete,”[560] they claimed. “[In science], the contradiction between its value function (of control, dominion, intensification of productive rhythm) and its liberating function is increasingly accentuated and explosive."[561] Starting from these premises, it was therefore possible to exploit these contradictions to build together a new society and a new techno-scientific system.

557 Grassroots left’s slang sometimes substituted the letter “c” with “k”, thus “capital” becomes “kapital”)

558 There is no date in the book, this is an estimate from the Archivio Primo Moroni. The most recent article quoted is September 1977. See: Collettivo Controinformazione Scienza Brescia, *Kapitale e/o Scienza* (Calusca Edizioni, 1977), 107.

559 In “Science against proletarians” there is no bibliography.

560 “Si è reso maturo il passaggio dalla critica della scienza alla scienza critica” Collettivo controinformazione scienza Brescia, *Kapitale e/o Scienza,* 88.

561 [Nella scienza] si accentua e si rende sempre piú esplosiva la contraddizione tra funzione valorizzante (di controllo, di dominio, di intensificazione del ritmo produttivo) e funzione liberante della scienza” Collettivo controinformazione scienza Brescia, 89.

However, the rest of *Kapitale e/o Scienza* made it difficult to imagine how to build this new techno-scientific system, and likewise *La scienza contro I proletari*, and *Capitale imperialistico e proletariato moderno*. If computers, and the scientific fields from which they stemmed, were so inherently tied to the "class enemies" of the proletariat, where did you even begin to make a new system? At the same time, neither was the opposite practice (not building a new technology, but destroying the existing one) particularly widespread within the left. To explain this claim, I return to the "armed party."

3.3.3 Make Bombs, not Computers. IBM and the armed party

From the 1970s, tension was growing in the Italian political climate and this was increasingly expressed through violence. Reports on a series of dramatic events from 1972 describe the context, highlighting the instances of left-wing, right-wing and State violence: on March 3, the Red Brigades carried out their first kidnapping, of Sit-Siemens manager Idalgo Macchiarini, released after several hours.[562] Although the organization did not kill its "class enemies" initially, it was ultimately responsible for the armed party's highest number of victims. On March 15, the body of Giangiacomo Feltrinelli was found near a high-voltage pylon on the outskirts of Milan, blown apart by an explosion. At first, fingers were pointed at neo-fascists but it later turned out he had died due to his own mistake while trying to sabotage the pylon.[563] On May 5, Franco Serrantini, an anarchist from the "Giuseppe Pinelli group" in Pisa, was violently beaten up by 15 policemen after a demonstration against the neo-fascist party Italian Social Movement (Movimento Sociale Italiano). He was jailed and left without proper medical assistance for two days, until found dead in his cell on May 7.[564] On May 17, police commissioner Luigi Calabresi, whom many considered responsible for Giuseppe Pinelli's death (at least "morally"), was shot near his home. Many political groups were unsuccessfully investigated by the police, from the neo-fascists and the anarchists, to the Marxist-Leninists. The actual killer was only discovered in 1988, when a former militant of the non-armed organization Lotta Continua confessed.[565] On May 31, a car bomb exploded in Peteano (Gorizia), killing three policemen and wounding two people. This was the third massacre carried out by neo-fascist organizations within the so-called "Strategy of Tension" after the Piazza Fontana

562 Galli, *Storia Del Partito Armato 1968-1982,* 38.
563 Galli, 40.
564 Antonio Senta, *Utopia e Azione: Per Una Storia Dell'anarchismo in Italia (1848-1984)* (Elèuthera, 2015). 216.
565 See: Carlo Ginzburg, *The Judge and the Historian: Marginal Notes on a Late-Twentienth-Century Miscarriage of Justice* (Verso, 1999).

bombing (1969, 17 deaths and 88 wounded) and the bombing of a train near Gioia Tauro (1970, 6 deaths and 50 wounded).[566]

On June 3 1972, the first documented attack against computers occurred.[567] During the night, five explosions took place in Milan, hitting Honeywell, IBM, and the Bank of America. In the following years, other attacks occurred, hinting at two obvious emotional practices: blowing up computers could mobilize fear within the "class enemies" of the revolutionary left, by showing the strength of the armed party (Revolutionary Fear); this could also mobilize Revolutionary Trust among the global proletariat, showing it was possible to counter the forces of imperialist capitalism. These emotional practices could weaken the Technopolitical Resonance of the Black Box Entanglement, because they showed that the technologically advanced, capitalist society it promoted was avoidable. The proletariat could reclaim its agency, by literally destroying the black-boxes that imperialist capitalism used to enforce its worldview on society.

These mobilizing emotional practices, however, could be associated with most of the armed party's violent acts, and generally with any (real or projected) war scenario. The armed party's attacks on computers seemed to have an immediate re-politicizing effect. However, I argue, in the long run they helped to de-politicize the micro-politics of computing within the left. These attacks added nothing new to the ongoing debates within and beyond the armed party about the political significance of computers. As discussed, these debates were disappointing at the micro-political level. The point is not that damaging computers or other technological artifacts is an inherently de-politicizing act. But the kind of attacks discussed here had a different political meaning than for example the Luddites' acts of sabotage or those described in *La scienza contro I proletari*.

First, computers were not a particularly popular target of left-wing political violence. Between 1969 and 1988 there were around twenty acts of politically motivated sabotage of computers in Italy.[568] In comparison, the number of violent acts committed by the left-wing armed group was much higher, totaling more than a thousand.[569] The act of breaking or destroying computers was not as much a defining political practice for the armed party as it was for the Luddites. Which is to say, computer attacks were not a specific strategy aimed at countering the Black Box Entanglement. Furthermore,

566 Della Porta, *Il terrorismo di sinistra*. 48.
567 Carlo Schaerf et al., *Venti Anni Di Violenza Politica in Italia*, 4 vols. (Università degli Studi di Roma "La Sapienza," Centro stampa d'Ateneo, 1992).
568 See Schaerf et al., four rich volumes documenting political violence in Italy. I researched the computer related attacks.
569 Della Porta, *Il terrorismo di sinistra*. 92.

the Luddites were directly involved with the machines they sabotaged, in the sense that the presence of machines was impacting workers' daily lives. In contrast, the armed party's attacks on computers sometimes had a more symbolic meaning, as I shall discuss.

Second, the small acts of sabotage described by *La scienza contro i proletari* (using chewing gum or nylon stockings) played on computers' specific technical vulnerabilities. Similar acts of sabotage challenged the Black Box Entanglement's micro-politics, because they interfered directly with the machine's design. In doing so, they showed that external actors could modify the functioning of computers in unexpected ways. The armed party's attacks on computers were certainly spectacular, but unimpressive from a technical perspective. The most common method was burning down computers and computer centers, either by throwing Molotov cocktails and other explosives, or by pouring flammable liquid on machines, then setting them on fire. Acid was also used on some occasions.[570] A fair degree of technical knowledge was certainly also required to perform such acts. But a Molotov cocktail does not demonstrate anything special about the functioning (and vulnerabilities) of a computer, besides the fact that it can be destroyed— like most objects—with explosives.

The first series of attacks against computers occurred from 1972 to 1976, all involving IBM and Honeywell offices and production sites, in Rome and Milan. These attacks were usually unsigned, and can also be seen as part of the overall increased use of violence in that period, rather than a specific armed party strategy.[571] The political motivation for these attacks was generally tied to global politics. Computer companies were attacked as symbols of the United States, and for their role in its military-industrial complex. These attacks expressed solidarity with the global proletariat, in its struggle against imperialist capitalism. In this sense, Revolutionary Fear and Trust were mobilized with a global arena in mind. The June 1972 attacks, for example, were in solidarity with the Vietnamese communist fighters, and accompanied by claims such as: "Honeywell produces computers and weapons for the imperialist war" and "IBM produces the computers which program the imperialist war."[572] Two attacks in Rome in 1974 (on November 3 against IBM and on November 5 against Honeywell), along with attacks on US-related targets, coincided with Henry

570 "Viso Scoperto e Pistole in Pugno Terroristi Incendiano Un Ufficio," *L'Unità*, May 4, 1978; Schaerf et al., *Venti Anni*, 687.

571 The various groups which made up the armed party usually claimed responsibility for attacks.

572 "La Honeywell produce i calcolatori e le armi per la guerra imperialista," " La 'IBM' produce i calcolatori che programmano la guerra imperialista." Ibio Paolucci, "4 Attentati Dinamitardi l'altra Notte a Milano," *L'Unità*, June 4, 1972.

Kissinger's visit to Italy.[573] In September 1976, the Honeywell offices, again in Rome, were attacked after a demonstration opposing the right-wing military junta coup in Chile.[574]

From 1976, until the last cases in the early 1980s, the computer attacks' targets were more diversified, and significantly more connected to Italian politics. The mobilization of Revolutionary Fear and Trust therefore largely played in the local political arena. Not only computer companies, but also computer centers in private or public institutions were bombed. In 1977, the computer centers in both Bocconi University (Milan) and the University of Rome were damaged. In some cases, the owners of the sabotaged computer, rather than the machine, were the actual target. For example, in 1980, the armed party attacked the economic newspaper *Il Sole 24 Ore* by burning its electronic typography equipment: the violence was directed at computers, but the real target was the newspaper (as symbol of imperialist capitalism).

A significant change in this second group of attacks is that the perpetrators admitted to committing most of them. However, these attacks on computers arguably were also symbolic, rather than a specific computer-centered political strategy. These attacks were carried out during the most intense period of left-wing political violence (1976-1980).[575] Yet, the groups owning up to this violence usually were small and only made one type of attack, implying that computer attacks remained a marginal aspect of armed struggle. The most active larger groups committing computer attacks were Front Line (Prima Linea) and the Communist Fighting Units (Unità Combattenti Comunista).[576] Front Line was, after the Red Brigades, the largest and most active armed organization. The number of computer attacks Front Line committed, however, is very small compared to its violent acts. In the case of the Communist Fighting Units, the ratio is higher. But the group was smaller, and the motivation stated for these attacks was not necessarily centered on computers. For example, on December 19 1976, they attacked the computer center at the multinational chemical company Montedison. Their official declaration focused on Montedison's wrongdoings and only addressed the computer's specific role at the end, describing how the computer was used by the Montedison masters against the workforce: "Therefore, the computer was an enemy of the workers; its sabotage

573 Schaerf et al., *Venti Anni*, 418. The first attack reportedly happened on November 2, other sources suggest November 3,"Roma: Provocatori Attentati Contro Due Società Americane," *L'Unità*, November 4, 1974.

574 "Cortei in Centro Contro Il Golpe Fascista in Cile," *L'Unità*, September 12, 1976.

575 Della Porta, *Il terrorismo di sinistra*. 59.

576 Both groups were established in the second half of the 1970s, with former militants of the non-armed organizations Potere Operaio and Lotta Continua. Computer-related attacks account for a small share of First Line's actions (about 4 computer attacks, 258 in total). The ratio was higher for the Communist Fighting Unit, but it was much smaller and shorter-lived (about 4 computer attacks, 27 in total). Della Porta, 92; Schaerf et al., *Venti Anni*, 568, 600, 601, 614, 714, 728, 807; "Viso Scoperto e Pistole in Pugno Terroristi Incendiano Un Ufficio"; Progetto Memoria, *La Mappa Perduta* (Sensibili alle Foglie, 1994).

meant a momentous disarticulation of command."[577] "Comrades, now the computer has burned," they concluded, this showed how the "autonomous struggle" was ready to organize the "class war." The attack thus mobilized generic Revolutionary Trust and Fear, rather than point out specific problems with computers.

The attacks described so far were directed at objects, and there were no human casualties. These kinds of attacks represented the majority of the armed party's violent acts.[578] There were, however, also frequent acts of violence against people, resulting in 142 deaths, of whom 26 were members of armed organizations, and almost 200 wounded (including 16 armed party members).[579] Kidnappings were also carried out, but mostly as a means to obtain money or the release of "political prisoners." Kidnappings generally did not end with the death of the hostage. Also when considering attacks against people, computers had a marginal role. Two examples stand out. First, the kidnapping of judge Giuseppe Di Gennaro by Proletarian Armed Nuclei (Nuclei Armati Proletari, NAP) on May 6, 1975 (he was released, alive, five days later). The judge was also the director of the penitentiary administration's electronic center, but this information was only mentioned briefly in the political declarations with the kidnapping.[580] Second, Olivetti manager Paolo Turin was wounded by Front Line in December 1979. This was part of a larger operation, when the organization attacked a business school, wounding a total of 10 people (5 professors, including Paolo Turin, and 5 students), accused of being the (present and future) ruling class of multinational companies.[581]

Ultimately, the armed party's computer attacks were symbolic rather than evidencing or countering specific aspects of the Black Box Entanglement. These attacks were part of a wider series of mobilizing emotional practices centered on Revolutionary Fear and Trust, and on Class Hatred. Computers symbolized the global proletariat's class enemies, and therefore successfully attacking them signified a victory for the proletariat over "imperialistic capital." But these attacks did not contribute to a re-politicization of computer debates or design. On the contrary, they merely strengthened the idea that computers were a tool entirely in the master's hands: their functioning did not require to be analyzed, but only halted.

577 "Il calcolatore era allora un nemico degli operai; sabotarlo è stato disarticolare momentaneamente il comando." Unità Comunista Combattente, "Volantino relativo al sabotaggio del Centro Datamont della Montedison" (1976). In: Progetto Memoria, *Le Parole Scritte* (Sensibili alle Foglie, 1996). 252.
578 Attacks against things accounted for 53 percent of violent acts. Della Porta, *Il terrorismo di sinistra*. 206.
579 17.3% of the cases, according to Della Porta, 206.
580 See the declarations released by the NAP during the De Gennaro kidnapping, in: Progetto Memoria, *Le Parole Scritte*. 234-238.
581 Schaerf et al., *Venti Anni*.

3.3.4 The bee, the communist and the IBM. A conflicted family album

Notwithstanding IBM's centrality in the Red Brigades' formative years, they never targeted IBM managers, nor equivalent figures at other computer companies in their actions (as far we know). Overall, computers did not feature significantly in the Red Brigades theoretical documents in the years after *Sinistra Proletaria.*[582] But, in 1978, the explicit criticism of computers again took on an important role in the Red Brigades narrative, as did IBM's symbolic significance.

In the 1978 "Strategic Direction" document,[583] the arguments used against IBM in *Sinistra Proletaria* were simplified and extended to computers in general. Electronics and information technologies were harshly criticized tools for anti-guerrilla repression and for reinforcing capitalist ideology: "We should not undervalue the application of computers to the repression of class struggle, because they bring with them, besides the efficiency of computers, the ideology behind them and the technical-military personnel who make them function."[584] The document then directly suggested attacking the people operating computer systems, defined as a "specific sector of the war."[585] These arguments performed a powerful mobilizing emotional practice, at once aimed at creating Revolutionary Fear in the imperialist capitalism (now called the "Imperialist State of Multinationals"), and fostering Class Hatred and Revolutionary Trust among the proletariat. Soon, these emotions would be even more powerfully mobilized by the Red Brigades' most tragically infamous action.

On March 16, 1978, the Red Brigades kidnapped the Italian prime minister and Christian Democracy secretary, Aldo Moro. He was accused of being the head of the party which embodied the Imperialist State of Multinationals in Italy. During his 55-day imprisonment, Moro endured what the Red Brigades called a "popular trial." He was asked to admit to the "crimes" committed by his party and by the Imperialist State of Multinationals. In this period, the Red Brigades had undergone major changes. Most of the original founders had been either imprisoned or killed.[586]

582 See the organization's "self-interview" and first "strategic directions" in: Soccorso Rosso, *Brigate Rosse. Che Cosa Hanno Fatto, Che Cosa Hanno Detto, Che Cosa Se Ne è Detto* (Feltrinelli, 1976).

583 A programmatic document compiled by the organization's leaders.

584 "Non dobbiamo sottovalutare l'applicazione dell'informatica alla repressione della lotta di classe perché essa porta con sé, insieme all'efficienza dei calcolatori, l'ideologia che ci sta dentro ed il personale tecnico-militare che li fa funzionare." Brigate Rosse, "Risoluzione Della Direzione Strategica," February 1978. in: Progetto Memoria, *Le Parole Scritte*.

585 "È importante attaccare queste reti di controllo far saltare le sue maglie, disarticolare questi apparati e ciò a partire dal personale tecnico-militare che li dirige, li istruisce e li fa funzionare contro il proletariato." Brigate Rosse, "Risoluzione Della Direzione Strategica."

586 Margherita Cagol died in 1975, shot by a policeman. Renato Curcio and Alberto Franceschini were in jail. They were still members of the organization, but no longer involved in daily operations.

Mario Moretti, the only one still alive and not in jail, managed to revitalize the organization, and was a leading figure in the Moro action. Political demands were made in exchange for Moro's life, including the release of Red Brigade "political prisoners" Curcio and Franceschini. Negotiations discussed whether or not to cooperate with the Red Brigades for Moro's release. The Pope also intervened in the debate, with an open letter asking to free Moro. Ultimately, however, both the State and the Red Brigades chose the hard line—on May 9, Aldo Moro was executed with a gun shot.

During the Moro kidnapping, IBM became once again central in the history of the Red Brigades. All their communications were typed on an IBM Selectric, model 6375: an electric typewriter with a "typeball" which could easily be changed to use different fonts in a document.[587] The font Light Italic size 12 points was chosen. The IBM typewriter became one of the most famous symbols of the Moro kidnapping and of the Red Brigades.[588] When a fake Red Brigades communication was sent to a newspaper on April 8, the most evident (and perhaps the only credible)[589] clue to its "authenticity" was the fact that it had been typed on an IBM Selectric.[590] Left-wing social movements also highlighted the symbolic significance of the IBM typeball: in 1981, the magazine *CONTROinformazione* published on one of its cover pages an IBM typeball, powerfully emerging from a blue background with an illegible hand-written note.[591] During the investigations following Moro's death, IBM machines and typeballs were seized all over the country as new Red Brigades headquarters were discovered. This search continued for years and till today it is still not clear whether the original typeball was found. As observed with dark irony by journalist Alessandro Silj analyzing the Moro kidnapping press coverage, the Red Brigades' decision to use an IBM Selectric actually generated "Great publicity for IBM. Thanks to the [Red Brigades], also the profane now know that there are not only machines which write with the 'traditional little hammers,' but also others that use a 'rotating typeball'."[592]

587 The model was first commercialized by IBM in 1961.

588 See: Alessandro Silj, *Brigate Rosse-Stato: Lo Scontro Spettacolo Nella Regia Della Stampa Quotidiana* (Vallecchi, 1978).

589 The document's validity was immediately disputed, as the language, the paper and the way it was sent differed from the usual Red Brigades style.

590 The fake communication was later attributed to counterfeiter and criminal Antonio Chichiarelli, although it is still not clear who ordered it. Galli, *Storia Del Partito Armato 1968-1982*, 167.

591 "Front Cover," *CONTROinformazione*, May 1981. The handwritten notes likely referred to those written by Moro while a hostage, but there were no other references to the IBM typeball or Red Brigades.

592 "Grande pubblicità per la IBM. Grazie alle BR, anche i profani ormai sanno che non esistono soltanto macchine che scrivono con i « martelletti tradizionali », ma altre che usano una « testina sferica rotante»." Silj, *Brigate Rosse-Stato: Lo Scontro Spettacolo Nella Regia Della Stampa Quotidiana*. 161.

The IBM Selectric was a powerful symbol, strengthening the mobilization of Revolutionary Fear and Trust in the Moro kidnapping. By using the IBM Selectric as their signature, the Red Brigades presented a different perspective on IBM than in *Sinistra Proletaria*. Back in the early 1970s, IBM was seen as the symbol of "imperialist capitalism," which had to be feared and hated by the global proletariat. But now IBM was (inadvertently) providing the tools used by the global proletariat to evoke fear in the forces of imperialist capitalism, and demonstrating the strength of the armed party. Therefore, on the macro-political level, the Red Brigades' IBM Selectric symbolized the potential to overturn (or at least weaken) IBM Society.

From a micro-political perspective, though, using the IBM Selectric demonstrated once again that technology's function had been overlooked in the Red Brigades history. The 1978 Strategic Direction did not "rehabilitate" computers. On the contrary, the discourse became even more explicit in deprecating them. According to Mario Moretti, the decision to use that particular IBM machine was not down to a technical analysis. An IBM technician reported to communist magazine *l'Unitá* that the IBM Selectric was a smart choice, because it would be difficult to find the Red Brigades' original typeball, as these were almost identical.[593] Mario Moretti, however, claimed he had not deliberately chosen that specific machine, even though it ultimately proved effective.[594] The main advantage was not anonymity, but, according to Moretti, the possibility to always use the same kind of typeball as an identity stamp. The typeball was easy to remove and insert in another typewriter: this was an important advantage for a clandestine group needing to move around the country without attracting too much attention. Traveling with a typewriter, or alternatively being forced to always write from the same place, was much more dangerous than going around with a small ball in your pocket, which could be then applied to different machines scattered around the country.[595]

The IBM typewriter was mentioned in a famous description of the Red Brigades written during the Moro kidnapping. In March 1978, *il manifesto* journalist Rossana Rossanda wrote an unforgiving analysis of the latest Red Brigades communications: "whoever has been a communist during the 1950s, immediately recognizes the new language of the Red Brigades. It is like looking at a family album: there are all the ingredients fed to us during the good old days of the classes on Stalin and Zhdanov.[596] [...] Whether young or old, the person who uses the famous IBM follows the scheme of

593 "II Messaggio Battuto Con Una Macchina « anonima»," *L'Unità*, March 22, 1978. 4.
594 Moretti, Rossanda, and Mosca, Brigate rosse. Una storia italiana. 144.
595 The Red Brigades had many secret headquarters all over Italy.
596 The notion of the "good old days" is ironic: Rossanda was certainly not a Stalin supporter.

old-style, orthodox communism. To which he adds a vision which is not old-style: guerrilla."[597] This depiction, unsurprisingly, generated much criticism, both from the Italian Communist Party and the rest of the left: nobody wanted to be in the same family, especially not as the Red Brigades. The notion of a "family album," however, evoked the Red Brigades' cultural and theoretical background.

At their core, many of the Red Brigades analyses and theoretical references were shared by other groups of the Italian left.[598] This theoretical proximity is also evident in the Red Brigades' perspective on computers and technological development. In 1980, Red Brigades members who had been jailed in the mid-1970s,[599] and called themselves Red Brigades Communist Prisoners Collective (Collettivo Prigionieri Comunisti delle Brigate Rosse), published a book *L'Ape e il Comunista* (The Bee and the Communist). The document was presented as the result of years of study and investigation, and is considered the group's last extended theoretical work, before the divisions in future years. Computers had once again a relevant role. The document confirmed the 1970 (*Sinistra Proletaria*) and 1978 (Strategic Direction) analysis, stressing the military components in the computer sector and insisting that the white-collar worker "proletarization" was due to increased automation.

The Red Brigades mobilized fear about the negative consequences of automation in the workplace. However, in *L'Ape e il Comunista,* computers were no longer just a threat to white-collar workers, but also to professionals such as teachers or doctors. According to the Red Brigades Political Prisoners Collective, intellectual work would be either downgraded or expelled from the production cycle.[600] The only way to solve this threat was sabotage. "Workers have always been reluctant to take sabotage beyond a certain point, and rightly so. Why? … for a lot of reasons! But it is necessary to profoundly and irreversibly establish this concept: the real productive capacity is in the intelligence and creativity of man; we should not be afraid of a technological withdrawal while destroying that mass of iron junk (like chains and controlling tools), which anyway won't be used

597 "Chiunque sia stato comunista negli anni Cinquanta riconosce di colpo il nuovo linguaggio delle BR. Sembra di sfogliare l'album di famiglia: ci sono tutti gli ingredienti che ci vennero propinati nei corsi Stalin e Zdanov di felice memoria. [...] Vecchio o giovane che sia il tizio che maneggia la famosa Ibm, il suo schema è veterocomunismo puro. Cui innesta una conclusione che invece veterocomunista non è: la guerriglia." Rossana Rossanda, "Il Discorso Sulla DC," *Il Manifesto*, March 28, 1978.

598 Like the fascination with Latin America and analysis of the "proletarization of technicians."

599 For example Renato Curcio and Alberto Franceschini.

600 "Cybernetics" was seen as a main source of this process, referring to Stafford Beer's work and his notion of "unthinkable systems." According to the Red Brigades, cybernetics reduced these systems to smaller and more quantifiable units, which could then be controlled. This thinking was at the heart of the transformations in the industrial sector.

once factory workers rule."[601] According to the Red Brigades, installing computers in the workplace, particularly in factories, could only reduce workers' welfare and their ability to self-determine. The automated factory became for workers "like the dark belly of a whale, a crypt, a tomb, an alien and horrendous nightmare."[602]

Class Hatred was also mobilized. *L'Ape e il Comunista* ended with 20 thesis. Thesis number 17 was clear about which strategy to adopt, already from its title: "Disrupt and destroy the apparatus of total social control!" The operational suggestion was to "hit on all levels the analysts and programmers at computer centers," who were considered "key technicians" of the computerized military apparatus. These claims ultimately rejected the possibility of finding a "socialist use" for computers. According to the Red Brigades Collective, the risks were overwhelming compared to any possible advantages.

However, the Red Brigades narrative on computers was ultimately ambivalent. On the one hand computers' features were exaggerated to depict a future when cybernetics-inspired command and control was indeed inescapable. But, on the other hand, the narrative placed human agency as a superior force capable of overturning this danger, and pointed at the humans who managed technology as the real enemy of the proletariat. Thesis 17's conclusion in *L'Ape e il Comunista* claimed: "If it is true that Information Technologies cannot achieve the 'unthinkable' goals which the horny imperialist bourgeoisie assign them […], it is also true that they are a powerful war tool because of their immediately repressive performances. Beyond the machine… it is man who must become the object of the most accurate interest of the revolutionary movement."[603] Indeed, as shown by the Moro kidnapping, when the Red Brigades thought it fit and useful, they had no problem in using the products made by such a remarkable symbol of the Imperialist State of Multinationals as IBM.

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601 "Gli operai, e giustamente, sono sempre stati restii a portare il sabotaggio al di là di un certo punto. Perché ? ... Per tante ragioni ! Ma occorre stabilire profondamente e irreversibilmente questo concetto: la vera capacità produttiva è nell'intelligenza e nella creatività dell'uomo; non dobbiamo temere un arretramento tecnologico distruggendo quell'ammasso di ferraglia (tipo catene e strumenti di controllo), che tanto non potrà piu essere utilizzato quando comanderanno gli operai." Collettivo Prigionieri Politici delle Brigate Rosse, "L'ape e Il Comunista," *Corrispondenza Internazionale*, December 1980. 176.

602 "La fabbrica diventa per l'operaio, che non accetta il rango di mongoloide o di focomelico, il ventre nero della balena, una cripta, una tomba, un incubo alieno ed orripilante." Collettivo Prigionieri Politici delle Brigate Rosse. 177.

603 "Se è vero che l'informatica non può raggiungere gli obiettivi "impensabili" che l'allupata borghesia imperialista le assegna [...], è vero anche che essa costituisce uno strumento potente di guerra per le sue prestazioni immediatamente repressive. // Al di là della macchina ... è l'uomo che deve diventare oggetto del più accurato interesse del movimento rivoluzionario." Collettivo Prigionieri Politici delle Brigate Rosse. 270.

Ultimately, the Red Brigades were thorough in analyzing the macro-politics of the Black Box Entanglement, but tended to overlook the actual functioning of technology. An example comes from the 1978 Strategic Direction, which describes the Italian State computer apparatus. The existence of four computers at the Ministry of Justice was pointed out as exhibiting its controlling power. In theory, this claim had some truth: more computers, more efficiency in State activities, including law enforcement. However, practically speaking, having four computers was actually very ineffective because these computers were not inter-operable.[604] More than the state's repressive power, this example illustrated its lack of technological know-how and its inefficiency. Similar examples feature in the IBM Study Group's articles in *Sinistra Proletaria* (1-2). These articles at first declared that McNamara's plan to wage the Vietnam War with computers was ultimately deemed a failure. Later, however, they magnified the computer's role in the same war: "Cybernetics and electronics are no less than chemistry and biology, and they provided equally powerful and effective weapons. Cybernetics produced tools to 'smell' the presence of guerrillas and 'see' through the intricate plantations and forest shadows, used skillfully by the Vietcong."[605]

The Red Brigades perspective, however, should not be dismissed as a case of "computerphobia" or an excessively "emotional" response. They were not an "anti-technology" group which rejected or feared technological development tout-court. Many emotions were involved in their writings and political practices, and these emotions were deeply tied to their theoretical analysis. The Red Brigades' communicative style became increasingly byzantine and obscure over time, and particularly in *L'Ape e il Comunista*, it is difficult to understand what they really meant. But there is an internal coherence in their discourse, and they were quite well-read. *L'Ape e il Comunista* ended with a very rich thematic bibliography, and a section on cybernetics and information technologies. This section presented two kinds of books. First, works by cybernetics pioneers like Norbert Wiener and Ludwig von Bertalanffy.[606] The work of Stafford Beer, mentioned in a different section, also came under this category. Second, contemporary Marxist analyses of computers, mostly from Italy and France. The French books were *Marxism et Informatique* by Quiniou (Marxism and

604 This same news was reported by the Italian Communist Party newspaper *L'Unitá*, but with an opposite interpretation of the Red Brigades, (see chap 4).

605 "La cibernetica e l'elettronica non sono da meno della chimica e della biologia e hanno fornito armi altrettanto potenti ed efficaci. La cibernetica ha prodotto per esempio strumenti per "annusare" la presenza dei guerriglieri e per "vedere" attraverso gli intrichi di chiaroscuro delle piantagioni e delle foreste utilizzate con abilitá dai Vietcong." *Sinistra Proletaria (1-2)*. 35.

606 Norbert Wiener, *Introduzione Alla Cibernetica* (Boringhieri, 1966); Ludwig von Bertalanffy, *Il Sistema Uomo. La Psicologia Del Mondo Moderno.* (ISEDI, 1967). Other cybernetics books were *La filosofia degli automi* ("The philosophy of automata"), with essays by pioneers of cybernetics, and *Macchine e Pensiero* ("Machines and thought") by Linguiti, a history of cybernetics. Vittorio Somenzi, ed., *La Filosofia Degli Automi* (Boringhieri, 1965); Gennar Luigi Linguiti, *Macchine e Pensiero* (Feltrinelli, 1980).

Information Technologies), *Informatique et Capitalisme* by Janco and Furjot (Information Technologies and Capitalism), and the Nora-Minc report.[607] On the Italian side, there were *Il Calcolatore del Capitale* (The Capital's Computer) by Marxist intellectual and computer expert Paola Manacorda, and a collection of essays *Che cos'è l'Informatica* (What are Information Technologies?) edited by Renato Levrero, a worker unionist at CGIL and member of the PCI section at Honeywell.[608]

In their analysis, however, the Red Brigades only focused on the optimism of the engineers' accounts and on the pessimism of the political analysts. Norbert Wiener's analysis of the potential risks of cybernetics was actually close to the Red Brigades' concerns about technology misuse. And Stafford Beer, whose book was very emphatically criticized, was working on establishing a cybernetic system in Salvador Allende's socialist Chile, Project Cybersin.[609] Though certainly very critical of the "capitalist" use of computers, both Paola Manacorda and Renato Levrero were proponents of a socialist re-appropriation of computers. Manacorda's book in particular carefully debunked the positive and negative "myths" surrounding computers: significant aspects of the Red Brigades computer discourses concurred with these negative myths.

Even though the Red Brigades knew that computers could not "achieve the unthinkable goals" of the "horny imperialist bourgeoisie," their discourses reinforced the idea that they could. From this perspective, there is a crucial, unresolved ambiguity in the relationship between the Red Brigades and the Black Box Entanglement: while pointing at its dangers, the Red Brigades also amplified its Technopolitical Resonance. This does not mean that the Red Brigades agreed with the Closed World ambitions. But they validated the impossibility of imagining computers outside Closed World ambitions—exactly what the Black Box Entanglement claimed. The black boxed design of computers was not a problem to address, because computers would anyway not have a place in the proletarian revolution. From a Technopolitical Resonance perspective, the Red Brigades did therefore not belong in the "family album" of Italian socialism discussed by Rossana Rossanda. They did not envision a possible re-appropriation of scientific and technological development like Malatesta and Gramsci; nor did they improve scientific education in the socialist movement,

607 Jean-Claude Quiniou, *Marxisme et Informatique* (Editiones Sociales, 1971); Manuel Janco and Daniel Furiot, *Informatique et Capitalisme* (Maspero, 1972); Nora and Minc, *L'informatisation de La Société: Rapport à M. Le Président de La République*.

608 Paola Manacorda, *Il Calcolatore Del Capitale. Per Un'analisi Marxista Dell'informatica* (Feltrinelli, 1976); Renato Levrero, ed., *Che Cos'è l'informatica. Storia, Tecnologia, Economia* (Mazzotta, 1977).

609 See: Fiorella De Cindio and Giorgio De Michelis, eds., *Progetto Cybersyn: Cibernetica per La Democrazia* (CLUP/CLUED, 1980); Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (MIT Press, 2011).

another key theme in classic Italian socialism. On the contrary, at times they spread false or exaggerated information on computers in order to sustain their claims.

3.4 Conclusion: Inside the Black Box Entanglement

IBM's presence in Italy informed emotional practices centered on the Black Box Entanglement, producing different outcomes in terms of the de/re-politicization of computer debates. Although IBM DirCom and the IBM labor unions re-politicized computer debates within IBM, their influence on public computer debates outside IBM was limited. Furthermore, their emotional practices did not indicate a specific alternative model for computer development: rather, they showed that it was possible to imagine and build such a model in generic terms. Conversely, IBM Italia connected with de-politicizing discourses that had an important public significance. IBM Italia management amplified the Black Box Entanglement's Technopolitical Resonance, both inside and outside the company, evidenced by the articles and conference proceedings in company magazine *Rivista IBM*. Paradoxically, left-wing armed movements also amplified the Black Box Entanglement's Technopolitical Resonance. Despite envisioning IBM promises as threats, they gave enormous credit to such promises, also fostering de-politicization.

IBM Italia's cultural outreach presented two competing discourses. On the one hand, IBM Italia communications established Technopolitical Resonance with the US military-industrial complex's Closed World, by performing mobilizing and regulating emotional practices informed by the Black Box Entanglement. IBM DirCom's successful book *Tre secoli di elaborazione dati*, was a deterministic and US-centric perspective on the history of computers. The book suggested that adopting IBM technologies was the only way to not fall behind this glorious historical path. Company magazine *Rivista IBM* published many articles amplifying the Black Box Entanglement's Technopolitical Resonance, promoting the adoption of computers as a way to not fall behind other Western Bloc countries, and as the best tool to overcome economic and political crises. However, IBM DirCom also produced content which, directly or indirectly, criticized the Black Box Entanglement and particularly its macro-politics. This criticism was apparent in book reviews about socialist history and political systems, and in its efforts to historicize technological developments. These contributions challenged the Black Box Entanglement in two ways: first, by fostering the idea that there were other valid political systems than capitalism, thereby mobilizing the Principle of Hope; second, by defying the positivist and deterministic narrative on technological development which sustained the Black Box Entanglement, thereby mobilizing Scientific Curiosity. In this way, IBM DirCom actually encouraged a re-politicization of public computer debates. This re-politicization weakened in the 1980s, when more articles strengthened the Black Box Entanglement.

Compared to IBM DirCom, the IBM labor union discourse was much more openly political. IBM Italia labor unions actively tried to demystify the company narrative and its use of Fear of Falling Behind. And, as shown by the transnational network of IBM labor unions, IWIS (IBM Workers International Solidarity), there was a significant Technopolitical Resonance between the IBM Italia labor union and other countries' unions. IBM unionists pointed out that IBM management often used emotional practices to control the workforce. The unions therefore aimed to re-politicize workforce relationships inside the company, mobilizing Working Class Pride. Furthermore, IBM labor unions observed a significant mismatch between the macro-political promises and the actual micro-politics of IBM computer design. IBM presented its "rationality" and technology as must-haves to prevent falling behind. But at the same time, labor unions pointed out that local computer developments were actually hindered by IBM management choices: even to its own employees, IBM computers were increasingly offered as black boxes. By emphasizing this mismatch, the labor unions mobilized Scientific Curiosity and fostered an even stronger re-politicization of computer debates. Likewise, their analysis did not just present abstract criticism of new value systems and forms of rationality, but also very concrete aspects of IBM's presence in Italy.

The history of IBM labor unions also briefly intersected with the history of the "armed party," left-wing groups preaching (and practicing) a violent, revolutionary overthrow of global capitalism. In the early 1970s, the IBM Study Group analysis of IBM's work organization fostered a complete identification between the company, its products, and the US Cold War military-industrial complex. In other words, the macro-politics of computer discourse and the micro-politics of computer design were seen as the same thing. Instead of Working Class Pride, Class Hatred became a central emotion, together with Revolutionary Trust and Revolutionary Fear. Although this perspective started with a very harsh critique of the Black Box Entanglement and its promises, the total identification of computer discourse and design ultimately reinforced the Entanglement. This caused a de-politicization of computer debates, because it rejected the possibility of re-appropriating the technology, and discouraged examining its functioning: it was pointless to discuss computers, as they were tools produced by the "class enemies" of the proletariat.

In the next chapter, we shall see that other historical actors had more consistent results both in re-politicizing computer debates and design, and in promoting this within society. Such re-politicization worked through performing emotional practices that not only openly defied and countered the promises of the Black Box Entanglement, but also highlighted a different set of technopolitical feeling-thoughts, namely the Principle of Hopeful Curiosity.

Chapter Four

Against the Black Box Entanglement: Technopolitical Resonance in Italian Democratic Socialism

"Soviet plus electrification does not make communism"
"Manifesto," CCCP (1987)[610]

"The computer is becoming a symbol of prestige, analogous to what the Church was to feudal lords —as long as they could control it. They were keen to have their own parish, then make it a diocese, then an archbishopric, and finally have a cardinal. Now we buy a computer, then a bigger one, and then an even bigger one," observed Giovanni Berlinguer at the first national conference on computers organized by the Italian Communist Party (PCI), in 1973.[611] The PCI was the party that showed the most interest in computers in Italy,[612] and the first to organize conferences dedicated to computers. The PCI, however, was not unconditionally enthusiastic about the new technology, as Giovanni Berlinguer's words show.

The PCI's interest in computers was informed by the ongoing critical debates within the Italian left. Many PCI members shared the grassroots left's concerns on the misuse of computers. "Regarding power, there is another similarity between the computer's role in contemporary society and the Church's role in feudal society: sometimes the symbol becomes an extraneous and dominating power," Giovanni Berlinguer warned.[613] The close relationship between the party and labor unions also gave the PCI a first-hand perspective on the sector's developments. It was not uncommon to find Olivetti, Honeywell, and IBM factory workers taking part in PCI National Congresses or on computer-themed committees. In the debates for the XV PCI National Congress (1975), Honeywell

610 "Soviet piú elettricità non fanno il comunismo." *CCCP – Fedeli alla linea* was a 1980s Italian punk rock band . This line is from the song "Manifesto" on the 1987 album "Socialismo e barbarie" (Socialism and barbarism) reversing Lenin's famous claim that communism is Soviet power plus electrification.

611 Giovanni Berlinguer was a PCI Central Committee member, and brother of party secretary Enrico. He was a medical doctor and university professor.

612 Claudio Pogliano, "Le Nuove Macchine: Inquietudine e Seduzione," in *Storia d'Italia. Annali 26. Scienze e Cultura Dell'Italia Unita*, ed. Claudio Pogliano and Francesco Cassata (Einaudi, 2011).

613 "Stiamo arrivando al punto che il calcolatore (per le aziende, per i ministeri, per gli ospedali, per I comuni) sta diventando un simbolo di prestigio analogo a quello che fu la chiesa, finche sottomessa, per I feudatari medievali. Questi tenevano ad avere la propria parrocchia, a trasformarla poi in diocesi, e questa in arcivescovado, ed infine ad avere il cardinale. Adesso si acquista un calcolatore, poi uno piú grande, e piú grande ancora. […] Anche sul piano del potere, spesso accade peró al calcolatore come al rapporto tra Chiesa e feudalesimo: il simbolo assurge a potenza estranea e dominante." Giovanni Berlinguer, "Conclusioni," in *Informatica, Economia, Democrazia* (Editori Riuniti, 1973). 216.

and Olivetti communist cells in Rome wrote a piece "Information Technologies as a new source of struggle for the country's democratic development."[614] They advocated an Italian and European "calculus plan" to foster local computer manufacturing. But they also argued that "the myth of the computer was born in the USA and today is still alive notwithstanding its huge failures. The most sensational one happened in Vietnam, where a very powerful army led by computers was defeated by a less powerful army of men who fought to protect their land."[615] The "American model," according to them, was also penetrating Europe and Italy through computer sales.[616]

The Italian Communist Party's interest in computers can be viewed from both a quantitative and a qualitative perspective. On the quantitative side, the PCI was much more active than the two other major parties, the Christian Democracy (Democrazia Cristiana, DC) and the Italian Socialist Party (Partito Socialista Italiano, PSI), when it came to discussing computers in parliament[617] and in public.[618] From a qualitative perspective, PCI's efforts were significant for the variety of social groups they targeted. The PCI was very committed on a cultural level. The Gramscian notion of "cultural hegemony" was key. This term denotes the ruling class power in the cultural realm, the values, expectations, and beliefs that prevail within a certain society. According to Gramsci, those aspiring to bring about a socialist revolution,[619] should also work on fostering a proletarian culture to serve as a counter-hegemonic force against the dominant, capitalist cultural norms. Therefore, the PCI sought a connection with the "intellectuals" and made efforts to promote education among the working class (with books, conferences etc.)

In this chapter, I discuss the significance of the Black Box Entanglement in the cultural and political field of "democratic socialism." Although focusing on the Italian Communist Party, my aim is not to retrace the official party line on computers. I am more interested in investigating the dialectics established between the PCI and the wider Italian left. In the 1970s, two main discourses on computers emerged within the PCI. The first had a deterministic undertone, which mobilized a socialist version of the "fear of falling behind." Computers and technological development were

614 Cellule Comuniste Honeywell e Olivetti, "L'informatica Nuovo Terreno Di Lotta per Lo Sviluppo Democratico Del Paese," *l'Unità*, February 14, 1975.

615 "Il mito del calcolatore è nato in America e continua ancora oggi nonostante pesantissimi insuccessi. La piú sensazionale sconfitta si è vista in Vietnam, da un esercito molto più potente guidato con i calcolatori è stato sconfitto da quello meno potente ma guidato da uomini e fatto da uomini che combattevano in difesa della propria terra." Cellule Comuniste Honeywell e Olivetti, 7.

616 They particularly denounced consultancy practices, which prevented computer users from actually understanding how machines worked.

617 For the period 1976-1991, see Italian Parliament archives: the PCI mentioned Information Technologies in 353 documents, the DC in 244 and the PSI in 136. https://storia.camera.it/, accessed September 20, 2022.

618 Claudio Pogliano, "Le Nuove Macchine: Inquietudine e Seduzione."

619 Although Gramsci became one of the main figures in the PCI's "democratic turn," he was a revolutionary socialist.

generally seen as positive forces in society. Their use should have expanded both in the industrial sector and public administration, where they could have greatly improved efficiency. The Italian electronics sector had to be revitalized, through investments and partnerships leading to State-owned, or at least State-controlled, multinational electronic companies. The second discourse promoted a more critical understanding of the long-term changes created by computers in social, cultural, and political realms. This perspective took its inspiration from "dissident" Marxist intellectuals like Raniero Panzieri and Marcello Cini and amplified the Principle of Hopeful Curiosity's Technopolitical Resonance.

My starting point is the PCI's early computer debates involving computer experts and intellectuals. The Principle of Hopeful Curiosity's Technopolitical Resonance was amplified, together with the Olivetti "Missed Opportunity" discourse. These debates were a first step in challenging the Black Box Entanglement, involving both the micro and macro-politics of computing. However, a socialist version of the Fear of Falling Behind was also mobilized, which in the long run prevailed in these discourses. I then focus on computer debates happening at the national level. I do so by analyzing PCI National Congresses and the political speeches and writings by PCI secretary Enrico Berlinguer. He performed emotional practices which countered both the Black Box Entanglement and the "anti-technology" attitudes of the grassroots left, informed by the PCI's Fear of Falling Inside both US capitalism and Soviet communism. Enrico Berlinguer also amplified the Principle of Hopeful Curiosity's Technopolitical Resonance, further encouraging a re-politicization of computer debates within the PCI. However, in the PCI's later years, the new leadership no longer fostered this re-politicization. In the final section, I discuss gendered debates on computers. These debates brought together PCI women, feminists, and women's organizations countering the gender-based discrimination associated with both the macro and micro-politics of the Black Box Entanglement. A new emotion emerged: "Creative Anger," that is, anger fostering new ideas, practices, and artifacts that can address its source. Women's Creative Anger re-politicized computer debates, at a time when the PCI's commitment was waning.

4.1 Democratic socialists and the Black Box Entanglement in the 1970s

From the late 1960s to the early 1970s, the Italian Communist Party faced significant changes and challenges.[620] Party members became increasingly engaged in debates about computers. These early debates happened in specialized conferences and publications, involving computer experts, researchers, and party members who had direct experience with computers (in public administration or industry).

Two important changes in Italy's history of computing evolved from the previous decade. First, computers were increasingly making their way in Italian society, most notably in public administration. IBM had a significant role in this development, which generated much criticism from the PCI: IBM was a US-based multinational and therefore a symbol of capitalism, and the PCI claimed that IBM computers were not appropriate for Italian technical needs. Second, also as a consequence of IBM's increasing influence in Italy, the PCI started to "rehabilitate" the Olivetti company. Olivetti was no longer a symbol of their political rival, the "paternalist master" Adriano Olivetti, but a local computer manufacturer worth supporting. In other words, the "Padrone Olivetti" narrative was replaced with the "Missed Opportunity" narrative, establishing Technopolitical Resonance between the PCI and the late Adriano Olivetti. The Missed Opportunity discourse, as seen in chapter 2, mobilized pride in Olivetti, and shamed the Italian ruling class for not supporting the company.

These early PCI computer debates were therefore marked by four main emotional practices. One, as IBM labor unionists, the PCI often claimed that IBM was mobilizing Fear of Falling Behind in Italy. Two, to counter the appeal of the Black Box Entanglement, the Principle of Hopeful Curiosity was mobilized.[621] Three, also to counter the Black Box Entanglement, PCI members mobilized a Soviet-inspired form of Fear of Falling Behind (Socialist Fear of Falling Behind), together with four, the Olivetti Missed Opportunity discourse.

620 Giorgio Galli, *Storia Del PCI: Livorno 1921, Rimini 1991* (Kaos, 1993); Silvio Pons, *Berlinguer e La Fine Del Comunismo* (Einaudi, 2006); Nello Ajello, *Il Lungo Addio: Intellettuali e PCI Dal 1958 al 1991* (Laterza, 1997); Paul Ginsborg, *A History of Contemporary Italy - Society and Politics 1943-1988* (Penguin, 1990).

621 As discussed in chapter 2, The Principle of Hopeful Curiosity rejects "scientific socialism" (and similar deterministic technopolitical visions), stressing the centrality of human agency in technological development and political struggles. It also encourages scientific education and eagerness to improve scientific knowledge.

4.1.1 Spring in Prague, Summer on the moon, Autumn in the factory. Italian Marxists and the non-neutrality of science

In the 1960s, debates on the non-neutrality of science became increasingly important for Italian Marxists, initially outside, then within the PCI. A key figure in these debates was physicist and PCI member Marcello Cini. By promoting these debates, Cini amplified the Technopolitical Resonance of the Principle of Hopeful Curiosity, reviving the Gramscian perspective on scientific and technological development. Cini did not explicitly mention Gramsci in his most well-known writings. However, I argue, he performed the same technopolitical feeling-thoughts because he criticized deterministic perspectives on science and technology, while also promoting scientific education. And he did so in a period when Italian Marxists were oriented towards the opposing idea, that technological development went hand in hand with the advancement of socialism.

Cini's criticism of scientific and technological development, powerfully mobilized Scientific Curiosity. Although critical, he never denied the importance of techno-scientific development. He was also an active science communicator, as member of the *Sapere*[622] editorial group and eventually editor in chief of its spin-off *SE/Scienza Esperienza*. Cini stated that his aim had always been to promote a third option, in between excessive enthusiasm of technology and the rejection of scientific and technological development that "the masters" expressed.[623]

Marcello Cini developed his criticism of science and technology in the early 1960s. As a physicist in academia, he witnessed first-hand scientific knowledge production in both a communist and a capitalist country where he attended scientific conferences. On his first visit to the USA in 1960, Cini realized that capitalism was indeed compatible with scientific and technological development, contrary to what Soviet propaganda claimed.[624] But his US visit was also an important time to develop his critical attitude towards contemporary science and technology, and to strengthen his socialist commitment. There, Cini noticed the clash between the country's astonishing technological levels, and the deep poverty in which many lived.[625] He was not favorably moved by the American "Technological Sublime":[626] "On the one hand, I was fascinated [with the USA]. But I was also

622 A popular science communication magazine.
623 Cini, *Dialoghi Di Un Cattivo Maestro*.
624 Cini. 80.
625 The same could be true for the Soviet Union. However, Cini found the economic inequalities he witnessed in the Soviet Union in 1959 more bearable than the ones in the USA. Cini. 81.
626 David E. Nye, *American Technological Sublime* (MIT Press, 1996).

terrified. For example, skyscrapers looked like a monstrous version of the Dolomites [mountains] which I loved so much."[627]

In the years following his travels to the USA, Cini became increasingly vocal against deterministic perspectives on scientific and technological development. The Space Race between the USA and the USSR often prompted Cini to mobilize the Principle of Hopeful Curiosity. Already in the early 1960s, while celebrating Yuri Gagarin's first space travel, Cini discouraged his PCI comrades from seeing scientific and technological progress as independent factors of well-being.[628] This was the same argument Gramsci made in his critique of Bukharin. Furthermore, Cini also stressed that human agency was the most important force for social change. He observed that technological developments, while undoubtedly improving the standard of living, could also in fact weaken "the ability to fight together with other men, in order to achieve common ideals which will make them feel like brothers."[629]

After the 1969 Apollo 11 moon landing, Cini reiterated this critique. *l'Unità* published enthusiastic articles about the moon landing, which set aside Cold War political animosities to celebrate what was considered an incredible scientific and technological achievement for the whole of humankind. Marcello Cini, however, argued that the Apollo landing, and the entire space race, was no more than a smokescreen: "The Moon's conquest was, first and foremost, a colossal propaganda coup. The most amazing circus show given to the plebs since Nero's times." Cini stressed the moon landing's emotional significance: "It was performed with the specific aim to scare the adversaries, conquer the undecided, and consolidate Americans in a fanatic bloc, exalting mystical faith in the system and in the nation."[630] In other words, Cini identified the mobilizing emotional practices performed by the US military-industrial complex through the moon landing, and specifically the Fear of Falling Behind ("scare the adversaries"). According to Cini, these techno-scientific achievements should not be seen as a victory for the humankind but were used to distract public attention from more urgent matters such as the Vietnam War, or the poverty and exploitation which most of the

627 "Per un verso ne rimasi affascinato. Ma anche terrorizzato. Per esempio I grattacieli mi sembravano una versione mostruosa delle dolomiti che amavo tanto." Cini, *Dialoghi Di Un Cattivo Maestro*. 82.
628 Cini. 83.
629 "La capacità di lottare insieme ad altri uomini per comuni ideali che li facciano sentire fratelli." Cini. 83
630 "La conquista della Luna è stata anzitutto un colossale colpo propagandistico, il più fantastico spettacolo di circenses che sia mai stato regalato alla plebe dai tempi di Nerone, attuato col preciso scopo di intimorire gli avversari, conquistare gli incerti, e cementare in un fanatico blocco gli americani, esaltandone la fede mistica nel sistema e nella nazione." Marcello Cini, "Siamo Caduti Nelle Maglie «del Più Colossale Colpo Propagandistico Regalato Alla Plebe Dai Tempi Di Nerone»?" *l'Unità*, July 26, 1969. 3.

world was still suffering. Cini's article was heavily criticized by other PCI members, who accused him of being against technology.

Regarding computers, Cini countered the Black Box Entanglement's Technopolitical Resonance by encouraging a wider reflection on the political and societal values inscribed in technological development. This contribution is mostly relevant from a macro-political perspective, in the sense that it mobilized mistrust in the grand narratives on technological development as always beneficial. From this perspective, the most famous book (co-authored) by Cini was *L'Ape e l'Architetto* ("The Bee and the Architect"), published in 1976 (not to be confused with the Red Brigades' *L'Ape e il Comunista)*. The book was a collection of essays[631] stressing the importance of framing techno-scientific developments within their social, cultural, and historical context. *L'Ape e l'Architetto* had a tremendous impact at the time, also because of the criticism it elicited among other more "orthodox" Marxists and scholars. The book's title was a reference to a famous passage by Marx,[632] comparing the bee's work to the architect's work. Both can produce astonishing technical artefacts, however the architect differs from the bee in that their intervention in nature stems from a larger plan. In this sense, scientists were architects, not bees. As Gramsci had also noted, science was a superstructure, profoundly embedded in history, ideology, and culture.

The micro-politics of computing had a more marginal role in Cini's work, as he did not focus specifically on this technology. In a 1971 article, then reported in *L'Ape e l'Architetto*, Cini discussed computers.[633] He stressed how new technological advancements always opened up choices. This amplified the Principle of Hopeful Curiosity's Technopolitical Resonance, as Cini stressed the human agency significance in shaping computing's micro-politics. Computers opened up highly contrasting scenarios, bringing either increased control or increased freedom. To steer choices in the latter direction, it was necessary to commit profoundly to an "alternative" use of machines, Cini argued. This was the same "socialist use of machines" encouraged by Raniero Panzieri. As we have seen, Panzieri's writings led to Workerism, a left-communist current

631 Many essays had already been published elsewhere.

632 Other authors used this for their book title, for example the Red Brigades' *The Bee and the Communist* (a reference to Marx not Cini). In 1978, François Mitterrand published a book *L'Abeille et l'Architecte* (The bee and the architect). Consequently, the French translation of Cini's book title is *L'Airagnée et le tisserand* (the spider and the weaver). Cini, *Dialoghi Di Un Cattivo Maestro*. 109.

633 Marcello Cini, "Mito e Realtà Della Scienza Come Fonte Di Benessere," in *La Scienza Nella Società Capitalista* (De Donato, 1971); Marcello Cini, "Mito e Realtà Della Scienza Come Fonte Di Benessere," in *L'Ape e l'architetto* (Feltrinelli, 1976).

emphasizing the workers' centrality in socialist politics. Panzieri was also a friend and an intellectual inspiration for Cini.[634]

Cini and Panzieri significantly re-politicized both technology discourses and design. They stressed that changing production relationships would not be enough to achieve the "socialist use" of the machines (and therefore foster a socialist society). Some machines (and, in Cini's case, some scientific fields) were inevitably harmful for workers. This could not be changed just by placing the machines in workers' hands. For example, a production plant built with no consideration for its environmental impact would keep on polluting no matter who oversaw the production. A macro-political change was not enough (using the machines in a socialist rather than a capitalist society); technology micro-politics also had to be addressed for the "socialist use of machines."

Cini was involved in two parallel conflicts developing in the 1960s and early 1970s, which had a negative impact on his ability to establish Technopolitical Resonance with other Italian Marxists. The first conflict, what Giuliano Pancaldi called "the Italian science wars,"[635] was about developments in the history of science as an academic field.[636] Until the late 1960s, the more influential current in the history and philosophy of science in Italy was the "Neo-Enlightenment" by Ludovico Geymonat. Not only the leading philosopher of science in Italy, until 1965 Geymonat was a member of the PCI.[637] His work was very well-received in the PCI, although, as mentioned in chapter 2, Geymonat criticized Gramsci for failing to discuss scientists' role as intellectuals. From the late 1960s, Neo-Enlightenment was challenged by emerging debates on the non-neutrality of science. During the 1970s, also as a reaction to more radical thinkers such as Cini,[638] Geymonat and his followers turned towards "an updated version of Lenin's dialectic materialism,"[639] which echoed a deterministic perspective on science and technology. This established a profound division between Geymonat followers and Cini followers.

634 Cini and Panzieri were connected by a personal and intellectual relationship. Cini recalled the influence Panzieri had on his thought process. See: Marcello Cini et al., *L'ape e l'architetto. Paradigmi Scientifici e Materialismo Storico* (Milano: Feltrinelli, 1976). 8; Cini, *Dialoghi Di Un Cattivo Maestro*.

635 Giuliano Pancaldi, "Purification Rituals: Reflections on the History of Science in Italy," in *Impure Cultures. Interfacing Science, Technology and Humanities*, ed. Giuliano Pancaldi and Massimo Mazzotti, 2010, 233–48.

636 Pancaldi; Simone Turchetti, "Looking for the Bad Teachers: The Radical Science Movement and Its Transnational History," in *Science Studies during the Cold War and Beyond* (Springer, 2016), 77–101; Angelo Guerraggio, "Il '68 Italiano e La Scienza: Premesse e Contesti," *PRISTEM/Storia, Note Di Matematica, Storia, Cultura*, no. 27–28 (2010).

637 After leaving the party, he remained involved in left-wing politics and became close to the Proletarian Democracy party.

638 Pancaldi, "Purification Rituals."

639 Pancaldi.

The other conflict concerned the PCI's international standing, and its allegiance to the Soviet Union. As seen in section 2.3.1, Cini was close to *il manifesto* group, formed to express dissent over the Soviet handling of the uprisings in Czechoslovakia, and expelled from the PCI in 1969. Cini joined the intellectuals positioned "at the left" of the PCI, which criticized the party, while not rejecting in principle the PCI's participation in institutional parliamentary politics (as the grassroots left did). The relationship between Marcello Cini and the PCI was complex, and he was certainly not a "party intellectual." His radical criticism of science was also very much appreciated by the grassroots left, and years later he would be categorized among the "cattivi maestri" (bad teachers) who allegedly contributed to the increased radicalization and violence in parts of the left.[640]

Although Cini was on the "left" side of the PCI, the debates on science and technology between PCI members and external intellectuals were frequent. What ultimately mattered, besides all the real and projected ideological differences in the Italian left, is that work by people like Marcello Cini powerfully fostered a re-politicization of science and technology debates within the PCI. Although the party followed the Leninist organizational principle of "democratic centralism," it was anything but a monolithic entity. The same applied to its techno-scientific vision. Regarding some technologies, most notably nuclear energy, the PCI was quite openly opposed to the rest of the left, and remained pro-nuclear until the 1980s, while the grassroots anti-nuclear movement grew. But regarding computers, I claim that, particularly in the 1970s, the debate was lively.

4.1.2 The French computer revolution? Seeking an alternative use of technology

After Marcello Cini's "heretic" perspective, I now turn to the PCI's "official" position on computers. In the early 1970s, PCI debates on computers were influenced by the French Communist Party (Parti Communiste Français, PCF). The French-Italian exchange was the catalyst for a re-politicization of computers' micro-politics within the PCI. Besides the political connection between the PCI and the PCF, there was another important tie between Italy and France: both had their own computer manufacturer, respectively Olivetti and Bull, trying to compete with IBM and the other US companies.

In the 1950s, the companies Bull and Olivetti emerged as powerful symbols against the Black Box Entanglement, by challenging IBM's market and cultural dominance. As seen in chapter 3, IBM

640 Addressed in Cini's autobiography, *Dialoghi di un cattivo maestro* (Dialogues of a Bad Teacher). (Bollati Boringhieri, 2001).

mobilized Fear of Falling Behind, claiming it was necessary to employ computers, and particularly *their* black-boxed computers, in order to not fall behind the global, technologically advanced, capitalist society they brought. Bull's history defied this argument by showing that a European producer could also successfully compete with IBM,[641] therefore weakening the appeal of the US Fear of Falling Behind. On the other hand, Adriano Olivetti challenged the desirability of a society "not to fall behind" due to IBM computers. His engagement with the arts, culture, and politics showed that it was possible to imagine a different Computer Age besides the IBM one.[642]

Bull and Olivetti's parallel endeavors, however, did not last long. In the 1960s, both the Italian and the French projects for a local electronics industry came to a halt. First, Adriano Olivetti died unexpectedly in 1960. As seen in chapter 2, in the ensuing restructuring, the electronics department was the first to go. A similar gloomy fate hung over Bull. From 1962, the company underwent a crisis: similar to Olivetti, it had invested too much in the electronics sector and consistent profits were slow in coming. They considered various strategies, including requesting more substantial State involvement and additional capital. But ultimately, Bull decided to sell some of its company divisions. By the late 1960s, Bull and Olivetti's computer production had been taken over by US company General Electric, which in that period was committed to overcoming IBM's dominance in the global computer market. However, General Electric's European reign was also short. Notwithstanding its successful acquisitions, the company also faced a crisis and in 1970 sold its computer division to Honeywell. Consequently, Honeywell-Bull (CHB) was established in France and Honeywell Information Systems Italia (HISI) in Italy.

The 1970s therefore started with a painful awareness for the French and Italian governments: IBM and the other US computer producers were once again the most important players in the European computer sector. However, whereas the Italian government was not particularly bothered about the situation, France showed more interest. In 1966, the French government launched its "Calculus Plan" (Plan Calcul), to foster (again) a local computer manufacturer that could successfully rival IBM and the other multinationals in France and the rest of Europe.[643] The French Calculus Plan was a concrete example of how to organize European computer production. The French Communist

641 In 1948, Bull overtook IBM in the French data processing market, and by 1960 was the second largest in the world. Bull remained significantly behind IBM, but its success was celebrated in France. Pierre E. Mounier-Kuhn, "Bull: A World-Wide Company Born in Europe," *Annals of the History of Computing* 11, no. 4 (1989): 279–97. 286, 289.

642 See section 2.2.

643 Pierre-E. Mounier-Kuhn, "Le Plan Calcul, Bull et l'industrie Des Composants: Les Contradictions d'une Stratégie," *Revue Historique* 292, no. 1 (1994): 123–53.

Party produced a critical analysis of the Plan, which would also become a blueprint for Italian Communist Party computer debates.

In 1972, the PCI publishing house Editori Riuniti published the Italian translation of *Marxisme et Informatique* (Marxism and Information Technologies, *Marxismo e Informatica* in Italian), by Jean Claude Quiniou.[644] This book became a fundamental reference for computer debates within the PCI, and was known in the Italian left.[645] *Marxismo e Informatica* originated from individual and collective reasoning within the French Communist Party magazine *ITC Actualités*, a short-lived publication for engineers, technicians, and managers.[646] Quiniou harshly criticized the French Calculus Plan, pointing out its ineffectiveness in countering IBM's power. In his critique, Quiniou mobilized the Fear of Falling Behind, because computer adoption was considered desirable and also urgent. But this was not the same fear sustaining the Black Box Entanglement. Quiniou's Fear of Falling Behind was tied to Scientific Curiosity. The book highlighted the Black Box Entanglement's negative impact, arguing that IBM and other US manufacturers were not actually fostering the sharing and building of technical know-how in Europe (and indeed the French Calculus Plan could not counter their influence). And Quiniou's fear was not of falling behind "a technologically advanced *capitalist* society" based on Cold War USA, but "a technologically advanced *socialist* society" based on Cold War USSR. This was a "Socialist Fear of Falling Behind."

Quiniou often mobilized enthusiasm for computers: "Soviets plus computerization make communism," he claimed, referring to Lenin's popular slogan.[647] He criticized US computer companies because they caused "the proletarization of the middle class,"[648] and were seriously responsible for the massacre of Vietnamese people.[649] However, he argued, computer use in the Soviet Union proved that these machines could be incredibly beneficial in a socialist society. Investing in the development of French computer manufacturing would raise the country's industrial level, and help the State improve its administration and public services efficiency—

644 Jean-Claude Quiniou, *Marxisme et Informatique* (Editiones Sociales, 1971), was translated into German and Italian - *Marxismo e Informatica* (Editori Riuniti, 1972), and widely promoted by the PCI.

645 The book was also read by the Red Brigades. See: Collettivo Prigionieri Politici delle Brigate Rosse, "L'Ape e Il Comunista," *Corrispondenza Internazionale*, 1980.

646 See: "ITC Actualites" in French Communist Party archives: https://archives.seinesaintdenis.fr/ark:/naan/a011483629182mXnCfZ, accessed September 20, 2022.

647 My own summary of a longer sentence. "It is not a joke to say: the building of socialism in France will be based on people's power plus the country's computerization". "Non è una battuta scherzosa dire: la costruzione del socialismo in Francia sarà íl potere del popolo più l'informatizzazione del paese'". Quiniou, *Marxismo e Informatica*. 140.

648 This was a similar concept of "the proletarization of technicians" discussed in chapter 3. Quiniou spoke about monopolistic companies' natural tendency to enforce the "proletarization of the middle class" ("proletarizzazione di strati medi"). Quiniou. 51.

649 Quiniou. 99.

provided it was done the communist way. The French Communist Party therefore proposed nationalizing the local computer sector. Nationalization was to be coupled with a "democratic management" of the sector, meaning that computer production and use had to be guided by people's needs. The need to further invest in local computer manufacturing was not limited to France. *Marxismo e Informatica* framed the French and Italian cases within a European perspective: A broader commitment was required to overcome US multinationals' influence, and establish European control over the continent's computer industry.

Quiniou's Italian translators included their own observations in the book, comparing the French and Italian contexts. The translators established Technopolitical Resonance with Quiniou and French comrades, as they also mobilized the Socialist Fear of Falling Behind. Comparing the French and Italian situations showed, notwithstanding Quiniou's criticism, that the French were in a much better position than the Italians. This further mobilized the Socialist Fear of Falling Behind, not only a (projected) technologically advanced socialist society, but also other West European countries. Furthermore, the Italian annotations in the book frequently referred to Olivetti. In this sense, Quiniou's Italian translation exemplifies the shift from the "Padrone Olivetti" to the "Missed Opportunity" discourse in PCI computer debates. Already in 1964, the PCI had criticized the sale of Olivetti's electronic division to General Electric. But computer debates were not common in that period. The early 1970s, on the other hand, saw an increase and more systemic interest in this theme. Quiniou's Italian translators decried the absence of an Italian manufacturer producing mid to large size computers in the country. "Why? Is it because in such a strategic sector we missed big opportunities? Why don't we have a FIAT or an ENI of computers?" the translators asked rhetorically. The answer was a lengthy reconstruction of "the Olivetti affair," the sale of its electronics division to General Electric. This implied that Italy had a "big opportunity" in the computer sector (Olivetti), but missed it.

The PCI's daily newspaper *l'Unità* heavily marketed Quiniou's book. Some years after its publication, *Marxismo e Informatic*a featured in the PCI's "Militant's Library."[650] This was a collection of books, mostly "classic" Marxist texts, from Lenin and Marx to Gramsci and Togliatti,[651] assembled by Editori Riuniti in preparation for the XIV PCI National Congress.

650 *l'Unità* advertised it, "Gli Editori Riuniti per il XIV Congresso Del PCI (Advertising)," *l'Unità*, February 1, 1975.
651 Palmiro Togliatti and Antonio Gramsci were two of the Italian Communist Party founders. While Gramsci died in 1936 in a fascist jail, Togliatti survived WWII, and successfully increased the electoral and popular consensus towards the PCI.

Quiniou was also a stable reference in the books by Piero Brezzi, who in the mid-1970s was the national referent for the PCI working group on electronics, as we shall see.[652]

Not everyone was convinced by Quiniou's analysis, though. L*'Unità* published a positive review of the book, but also included sharp criticism. According to the reviewer,[653] the book provided many interesting data and information on computer industry developments, but failed to actually provide the "Marxist perspective on computers" as intended: Quiniou was not able to show that Marxism had something more to say about computers than what scientists were saying.

In 1973, the magazine *Sapere* published an article "A political analysis of information technologies," outlining the "Marxist perspective on computers" missing in Quiniou's book. It was authored by researcher and computer expert Paola Manacorda, a former Olivetti employee.[654] Manacorda remarked that many analyses on "the political consequences of computers" had been produced, but no satisfactory "political analysis of computers." She therefore provided one: criticism of the "capitalist use of machines" (Panzieri) and of the "capitalist use of science" (Cini) were in this way united, challenging the "capitalist use of computers."

Manacorda sharply criticized Jean-Claude Quiniou's book, arguing that he reproduced the Soviet technocratic perspective. According to her, Quiniou's analysis lacked two essential aspects: first, from a political perspective, certain sectors such as education and healthcare needed a structural intervention much more than a technological one; second, from a technical perspective, Quiniou put too much trust in technological development promises, which in reality were often exaggerated and led to a waste of public resources. In other words, techno-scientific knowledge should not be privileged over other sources of knowledge.

The article also offered a poignant critique of the Black Box Entanglement. Manacorda repeatedly addressed its macro-politics: she mobilized skepticism and mistrust by underlining that its promises were exaggerated. But she also challenged the Black Box Entanglement's micro-politics as she grounded her criticism in the analysis of how computers actually functioned. Manacorda critically examined the most common "positive myths" surrounding computers namely their "rationality,"

652 Piero Brezzi, *Elettronica e Società* (Casa Editrice G. D'Anna, 1975), and *L'industria Elettronica* (Editori Riuniti, 1976).
653 The review was signed with just the initials "a.l.p."
654 Paola Manacorda, "Per Un'analisi Politica Dell'informatica," *Sapere*, August 1973.

and “negative myths,” for example technology-led unemployment.[655] Most of the “computer myths” she discussed are also seen in computerphobia research (CAP), but presented respectively as “fears” and “facts.”[656] By referring to both as “myths,” Manacorda performed a different regulating emotional practice than enforced by CAP research: overly enthusiastic and overly pessimist feelings were informed by “myths” not “facts” and were therefore both undesirable. Through this regulating emotional practice, Manacorda amplified the Principle of Hopeful Curiosity. Her critical examination of positive/negative myths encouraged (and practiced) Scientific Curiosity toward computers. And her overall discourse challenged deterministic perspectives on the political significance of computers, even socialist ones (Principle of Hope).

From the 1970s, Manacorda became an influential analyst on computers’ political and societal implications, combining a tireless commitment to the public communication of technology with her job as a computer consultant.[657] Manacorda was closer to the *il manifesto* group than the PCI. In fact, she belonged to the *Sapere* editorial committee, and then *SE-Scienza/Esperienza*. Like Cini, she was one of the independent Marxist intellectuals who helped re-politicize PCI computer debates.

4.1.3 Notes for a resonant calculus plan. Early PCI computer conferences

Some months after the publication of Manacorda’s article, the PCI held its first national conference on computers. The conference “Informatica, Economia, Democrazia” (Computers, economics, democracy), was held at Istituto Togliatti in Rome from 11 to 13 October, 1973. The key theme was not only “the socialist use of machines” but more specifically “the Italian Communist Party road to computers.” This conference presented an interesting situation. While *l’Unità* widely advertised Quiniou’s book, and the Italian Science Wars were bringing academic Marxists towards dialectic materialism, the attendees amplified the Principle of Hopeful Curiosity’s Technopolitical Resonance. Paola Manacorda attended the conference, and her work was mentioned more than once, and more favorably and significantly than Quiniou’s. the Black Box Entanglement was

655 On technological unemployment in the US, see: Amy Sue Bix. *Inventing ourselves out of jobs?: America's debate over technological unemployment, 1929-1981*. (Johns Hopkins University Press, 2000).

656 See: Michelle M. Weil, “Computerphobia Reduction Program: Clinical Resource Manual” (California University Press, 1988).

657 Some 1970s and 80s works by Paola Manacorda are: *Il Calcolatore Del Capitale. Per Un’analisi Marxista Dell’informatica* (Feltrinelli, 1976); *Informatica Sanitaria: Storia Ideologia Tecnologia* (Feltrinelli, 1980); *Lavoro e Intelligenza Nell’età Microelettronica* (Feltrinelli, 1984); Paola Manacorda and Paola Piva, eds., *Terminale Donna: Il Movimento Delle Donne Di Fronte al Lavoro Informatizzato* (Edizioni Lavoro, 1985); Paola Manacorda, ed., *La Memoria Del Futuro: Economia, Cultura, Politica Nella Società Informatizzata* (La Nuova Italia Scientifica, 1986).

addressed, demonstrated by the frequent criticism of multinational companies not sharing technological know-how. But the Socialist Fear of Falling Behind mobilized by Quiniou's "technocratic" enthusiasm was not the foremost emotion in the conference attendees' minds. They focused on sharing and discussing what it could mean to build a "PCI road to computers." This road was based on a critical attitude toward computer promises, and on the centrality of human agency in designing and using computer systems (Principle of Hopeful Curiosity). In this way, the PCI further re-politicized computer debates.

The concluding remarks illustrate how the Principle of Hopeful Curiosity was mobilized at the PCI conference. Computer myths and illusions were key points in Giovanni Berlinguer's closing speech: "This PCI seminar confirmed […] how Information Technologies risk becoming the next technological utopia, the next foothold for the illusion which has always followed, historically, new scientific discoveries and technical applications (it would be interesting to describe this circularity of illusions-delusions which follows each technological cycle, probably from the wheel until the steam machine, electricity, automation)."[658] This claim alone powerfully mobilized the Principle of Hopeful Curiosity, as it contained skepticism over scientific socialism, but also fostered Scientific Curiosity by encouraging exploration with different sources of scientific knowledge. This observation was followed by a critique of the Soviet Union's "ideological dogmatism," resulting in categorizing cybernetics as a "bourgeois science."[659] As we see in section 4.2.1, Berlinguer also provided a negative example of computer use in the Soviet Union, stressing that looking at the "Soviet road to computers" was not enough to imagine the "PCI road to computers."

Giovanni Berlinguer only mentioned Quiniou to stress his disagreement with how he framed (once again) cybernetics. According to Berlinguer, Quiniou failed to see the potentially positive outcomes from this new scientific field. As Berlinguer had also criticized Marcello Cini's moon landing article, his views opposing both writers were also a critique of the more radical attitudes in the non-neutrality of science discourse. Berlinguer was, however, positive about Manacorda's work, observing that the computer could indeed reproduce capitalist ideology. Berlinguer encouraged the

658 "Il seminario del PCI ha confermato peró […] che l'ifnormatica rischia di diventare la nuova utopia tecnologica, il nuovo appiglio per l'illusione che ha sempre accompagnato, nella storia, l'emergere di ogni scoperta scientifica e di ogni nuova applicazione tecnica (sarebbe interessante descrivere questa circolaritá di illusioni-delusioni che è seguita ad ogni ciclo tecnologico, probabilmente dalla ruota, fino alla macchina a vapore, all'elettricitá, all'automazione)." Berlinguer, "Conclusioni." in AA.VV., *Informatica, Economia, Democrazia.* (Editori Riuniti, 1973). 208.

659 Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics* (Cambridge, MA: MIT Press, 2002). 124.

Workers Movement initiatives which re-politicized the micro-politics of computing, as they could also bring about change at the macro-political level.

Many of the PCI seminar participants pointed out the Black Box Entanglement's influence in Italy, underlining that its micro and macro-politics were intertwined. In doing so, PCI members performed a mobilizing emotional practice, generating mistrust of US multinational computer companies, while also promoting Scientific Curiosity. IBM was the primary target of these emotional practices. Napoleone Colajanni, for example, observed that multinational companies working in Italy did not share technical know-how, because of the many production inter-dependencies and the US head office's tight control. Furthermore, IBM's aggressive marketing strategies fostered the adoption of unsuitable computer systems, exacerbating the problem: "under the pressure of IBM's frenetic commercial activity, we install over-sized computers. Consequently, less than 50 percent of the machine's capacity is used. The cultural orientation tied to IBM's commercial activity and other American companies is a delay factor. This is made even more serious by IBM dominance in training technical staff to work in the sector."[660]

Computer use in Public Administration (PA) was frequently addressed. Here too, the Black Box Entanglement was highlighted as a negative factor. According to Giuliano Bianchi, a worker unionist, computers were generally under-used or misused in Italy's PA. As also observed by Colajanni, half of the machines belonged to IBM, which was also in charge of computer training courses.[661] Emilia Romagna and Tuscany were the regions with the highest number of computers, a particularly relevant statistic as the PCI also had a significant number of followers in these regions. Bianchi reflected on the presence of foreign computer companies in his country. His criticism established Technopolitical Resonance with Colajanni, as he commented negatively on computer vendors' emotional practices: "the monopoly does not come from an exclusive technical know-how […]. It comes from the strict control over the industrial exploitation of technological and scientific research. […] Psychological pressure, ability to persuade and penetrate, cultural prestige, technical

660 "Sotto la pressione della frenetica attivitá commerciale della IBM si installano calcolatori sovradimensionati, col risultato che la macchina viene utilizzata molto spesso a meno del 50% delle proprie capacitá. L'orientamento culturale legato all'attivitá commerciale di IBM e altre case americane è un fattore di ritardo, reso ancor piú grave dal predominio che la stessa IBM esercita nella formazione dei quadri tecnici da occupare nel settore." Napoleone Colajanni, "I Problemi Del Mercato e Della Produzione: Applicazioni Dell'informatica," in *Informatica, Economia, Democrazia* (Editori Riuniti, 1973). 199.

661 The second largest company was Honeywell, accounting for only 35% of Italian Public Administration computers. The only exception was in "Southern Italy and Islands" with almost equal numbers of IBM and Honeywell computers. AA.VV., *Informatica, Economia, Democrazia.*

competence are the tools enforcing this control."[662] These tactics, some of which Bianchi defined as "technological terrorism," were also "tools of control" that multinational companies exerted over scientific and technological research.

Colajanni and Bianchi's criticism of IBM's role in Italy was echoed by Giovanni Berlinguer, who in his closing remarks noted how "this dependency [on multinational companies] seriously limits the development of both the economy and democracy, as shown by the reports at the seminar. Just think about what the Italian State risks becoming, since its functions are sometimes programmed by IBM."[663] In other words, the Black Box Entanglement had a detrimental de-politicizing effect not only on computer debates and design, but also on the institutions using the black-boxed technologies: the computer was indeed a tool to promote the capitalist ideology. To avoid such a scenario, the conference's final recommendation was to improve the efforts in four areas: production and R&D; computer applications for organizing work; demand for and use of computers in the production and service sectors; education and training in how computers work.

Another conference followed, on April 20 the next year: "Informatica, Industria, Programmazione, Universitá" (Computers, Industry, Planning, University). The self-organized seminars at University of Turin and the Piedmont region PCI section partnered to hold this conference. Piedmont was one of the most industrialized regions in Italy, with the FIAT headquarters and production plants, as well as Ivrea, the Olivetti company town. Many of the 1973 conference's attendees were there, for example Lucio Libertini, PCI Central Committee member, who gave the opening speech. Libertini explained the PCI perspective on computers: "The communists' initiative for electronics and computers […] has two main reference points. The first, is the critical level reached by the use of computers and information sciences […]. The second, is its connection with [capitalism]'s crisis, and with the necessity to outline and build a precise alternative."[664] The first PCI point challenged

662 "La situazione di monopolio non deriva, infatti, da una esclusivitá del know how tecnico […], ma dal rigido controllo dello sfruttamento industriale dei risultati della ricerca scientifica e tecnologica. […] Pressione psicologica, capacitá di penetrazione e di persuasione, prestigio culturale, competenza tecnica rappresentanto gli strumenti mediante il quale il controllo si attua." Giuliano Bianchi, "Calcolatori, Pubblica Amministrazione, Riforma Regionale," in *Informatica, Economia, Democrazia* (Editori Riuniti, 1973). 125.

663 "Questa dipendenza crea gravi limiti allo sviluppo sia dell'economia che della democrazia, come hanno dimostrato gli interventi e le relazioni svolte nel seminario. Basta pensare a quel che rischia di diventare lo Stato italiano, le cui funzioni sono a volte programmate dalla IBM." Berlinguer, "Conclusioni." in AA.VV., *Informatica, Economia, Democrazia.* 215.

664 "L'iniziativa che i comunisti hanno assunto nel campo dell'elettronica e della informatica […] ha due essenziali punti di riferimento. Il primo è la soglia critica cui è giunto l'impiego di calcolatori e della scienza della informazione […]. Il secondo è il nesso che tutto ció ha con la crisi del modello di sviluppo economico, e con la necessitá di delineare e di costruire ad esso una alternativa sufficientemente precisa." Lucio Libertini, "I Contenuti Economici e Culturali Di Una Scelta Politica," in *Informatica, Industria, Università, Programmazione* (Gruppo Editoriale Piemontese, 1974). 9.

the Black Box Entanglement 's micro-politics, as it stressed the need to improve local technological know-how on computers. The second point underlined PCI's rejection of the Black Box Entanglement 's macro-politics, and the party commitment to build not only an alternative computer vision, but also an alternative society in general.

As in 1973, two speeches focused on computer use in Public Administration (PA) and the limitations of outsourcing it to private companies. Luigi Rivalta, a Piedmont regional council member, outlined the proposal for a regional computing center in Piedmont, while Sante Bajardi, a provincial council member, discussed computer use in Piedmont's PA. Both stressed the Black Box Entanglement's negative impact on local public administration. Rivalta commented how it was vitally important to have direct control of the technology used in PA, because "the choice of which information to collect, how to collect it, which techniques and programs are used to process the data, can be tools for manipulating knowledge, the individuation of alternatives and forecasting."[665] Bajardi showed how computer use in Piedmont PA was increasing, as new and bigger machines were purchased. But these systems remained underused. According to Bajardi, the reasons for their upgrade were related to trends and, mostly, to "the manufacturing companies' promotional activities, which first infiltrate different sectors then gradually expand."[666] This pattern was problematic because it increased the dependency on external companies and weakened political planning.

The Olivetti Missed Opportunity discourse was often employed. For example, Renato Levrero, from the Honeywell communist cell, sharply criticized the Olivetti company's handling of the situation after Adriano's death. Levrero argued that Olivetti abandoned its electronics production for political and economic reasons, not technological: "It is only because of the Italian bourgeoisie's greed that [Olivetti] was sold out to the USA."[667] He also drew a parallel with the French company Bull, which was sold to General Electric like Olivetti, but whose minority ownership quote was retained by French capital. This reinforced the Missed Opportunity discourse, further emphasizing the Italian ruling class's ineptitude: "The French bourgeoisie and the French government always

665 "La scelta delle informazioni da raccogliere, la modalitá della loro raccolta, le tecniche e i programmi di elaborazione possono essere strumenti di manipolazione della conoscenza, della individuazione delle alternative e delle previsioni." Luigi Rivalta, "La Proposta per Un Centro Di Calcolo Regionale e La Programmazione in Piemonte," in *Informatica, Industria, Università, Programmazione* (Gruppo Editoriale Piemontese, 1974). 68.

666 "Ma il fattore determinante è l'azione promozionale svolta in primo luogo dalle aziende produttrici che tende in primo luogo ad introdursi nei vari ambienti per poi espandersi gradualmente." Sante Bajardi, "Informatica e Pubblica Amministrazione in Piemonte," in *Informatica, Industria, Università, Programmazione* (Gruppo Editoriale Piemontese, 1974). 77.

667 "Solo la grettezza degli interessi della grande borghesia italiana ha permesso che fosse svenduto agli USA." AA.VV., *Informatica, Industria, Università, Programmazione* (Gruppo Editoriale Piemontese, 1974). 98.

showed their independence from US interests, something which always looked like sacrilege in the eyes of their Italian counterparts."[668]

Mario Bolognani, from Euratom,[669] also mobilized the Missed Opportunity discourse. He observed how Olivetti's sale defined the end of Italian computer manufacturing, and its dependency on foreign vendors. Olivetti's relevance was not only national, but also European. Bolognani harshly criticized the European Economic Community (EEC) guidelines on technological development. At this time, it was crucially important to counter the US multinationals' influence: "it would be a serious mistake to now leave the initiative to the polluters of computing, which are the big monopolies and those who sustain them. They filled Europe with under-used computing systems. In a continuous and artificial drive toward technological innovation and to keep up with the competition, they absorbed enormous capital which crossed the Atlantic in 90 percent of the cases."[670] Local computer manufacturing had to be supported.

In his conference conclusions, Napoleone Colajanni performed an explicit regulating emotional practice: "We have to push away both excessive fears and excessive enthusiasm [for computers]."[671] The goal was the PCI road to computer society, not the Soviet one. Colajanni asked "if we want to avoid the risk that those top-down choices will consolidate the actual state of things, what should we rely on?" The answer was straightforward: use the strengths directly involved in the sector, like the people taking part in the conference. Colajanni concluded by mobilizing amusement about IBM: "In the computer sector there is a direct contradiction: something that can lift the human spirit the most is being degraded the moment it enters the commercial circuit. I don't want to joke about this, but IBM is selling a modern science achievement using the same sales pitch as a Neapolitan street vendor. It is not about solving a problem, but a sales technique that will keep on selling the biggest computer."[672] Here Colajanni was also mobilizing Scientific Curiosity: by remarking that computers

668 "Ma la borghesia e il governo francesi hanno sempre dimostrato una indipendenza dagli interessi americani che è sempre sembrata sacrilega ai loro omologhi italiani." *Informatica, Industria, Università, Programmazione.* 94.

669 An international organization established in 1957, with the aim to provide a common European market for nuclear energy production and sale.

670 "Sarebbe un grave errore lasciare ora l'iniziativa agli inquinatori di informatica, cioé ai grandi monopoli e a chi li sostiene, a coloro che hanno riempito l'Europa di sistemi di calcolo sotto-utilizzati e che, in una corsa continua e artificiale verso l'innovazione tecnologica per reggere il ritmo della concorrenza hanno assorbito capitali enormi che per il 90% hanno valicato l'Atlantico." *Informatica, Industria, Università, Programmazione.* 103.

671 "Dobbiamo allontanare eccessive paure ed eccessivi entusiasmi." Napoleone Colajanni, "Conclusioni: L'elettronica in Un Nuovo Modello Di Sviluppo," in *Informatica, Industria, Università, Programmazione* (Editori Riuniti, 1974). 120.

672 "Io credo che il nostro rapporto, in primo luogo con la classe operaia, con gli amministratori, con i ricercatori, con gli uomini di cultura, deve essere molto ricco di tutta la elaborazione tecnica (abbiamo dimostrato che ne siamo anche capaci); ma deve avere il contenuto di una forte carica ideale Nel settore dell'informatica piú direttaente si verifica una contraddizione per la quale alcune fra le produzioni piú alte dello spirito umano nel momento in cui

were a “modern science achievement,” yet IBM sold them as they were cheap t-shirts, he implied that this technology had to be studied and rightfully employed by the communists. This could benefit everyone: “Are we sure that IBM vendors are happy about their role? Probably not,” concluded Colajanni.[673]

The concerns PCI members expressed over the Black Box Entanglement’s negative influence in Italy were not only ideological. These first computer debates happened in parallel with the development of a very ambitious, and ultimately unsuccessful project for digitizing the national tax register. In the late 1960s, the Italian government started a national tax system reform, first under Minister of Finance Luigi Preti and later his successor Bruno Visentini, who was also Olivetti’s CEO.[674] Most notably, the reform established Italy’s first electronic tax register. This innovation was widely publicized, even before its introduction. Already in 1967, Luigi Preti praised the future electronic system, which would allow any citizen to see fiscal information “just by pushing a button.”[675] On November 25 1971, the Italian State signed an agreement with IBM Italia to provide a computer system for the electronic tax register “ATENA” (Anagrafe Tributaria Elettronica Nazionale). Athena, the Ancient Greek goddess of knowledge is Atena in Italian.[676] In the following years, ATENA saw many delays and changes from the original plan. Notwithstanding the State’s consistent economic investments,[677] and the great initial publicity, the project was a complete failure. The ATENA system never became active and was ultimately dismissed before it was even completed. After conducting a detailed project evaluation,[678] in January 1976 Bruno Visentini officially admitted that ATENA had not worked, and was ill-conceived from the start.[679]

In the second half of the 1970s, ATENA was seen as a typical example of the Italian government’s failings, both in the technology sector and in policymaking. The situation was made even worse when the Rome procurement started a judicial procedure against Bruno Visentini. He was cleared of

entrano nei circuiti commerciali sono degradate. Non vorrei fare una battuta, ma la tecnica di vendita dell’IBM consiste nello smerciare una delle conquiste della scienza moderna con la stessa tecnica dei magliari napoletani. Non si tratta di risolvere un problema, ma di vendere il calcolatore sempre piú grande, usando la tecnica dell’imbonimento.” Colajanni. 126.

673 “Siamo sicuri che I venditori dell’IBM sono contenti del loro ruolo? Probabilmente no.” Colajanni. 126.

674 Preti belonged to PSDI, Partito Socialista Democratico Italiano and Visentini to PRI, Partito Repubblicano Italiano, both small social-democratic parties.

675 Preti, quoted in “Attenzione! Il Fisco Si Elettronifica,” *l’Unità*, August 18, 1967.

676 “Rapporto Sull’anagrafe Tributaria” (Ministero delle Finanze, 1976), 19.

677 The project cost almost 40 billion lira (see: “Rapporto Sull’anagrafe Tributaria,” 25), the equivalent of over 200 million euros in 2020, see: http://rivaluta.istat.it:8080/Rivaluta/, accessed September 20, 2022..

678 This review was run with ITALSIEL and published in 1976 as “Rapporto sull’anagrafe tributaria.” When the project was officially halted, its initiator Luigi Preti claimed ITALSIEL had started a “sensationalistic campaign” against ATENA. Seduta Pomeridiana Camera dei Deputati, March 9, 1976. 26530.

679 “Anagrafe Tributaria: Il Ministro Afferma Che Non Ha Mai Funzionato,” *l’Unità*, January 22, 1976. 2.

all the charges, but the press was quite unforgiving of ATENA's failure, often defined as a "scandal," and not only by communists.[680] This was a powerful mobilizing emotional practice, evoking disdain and anger against IBM, but also against the government. In this sense, this mobilizing emotional practice also established Technopolitical Resonance with the Missed Occasion discourse, because it highlighted the Italian government's failure in the computer sector (not just unable to support a local computer manufacturer like Olivetti, but not even able to simply use computers).

The ATENA project was not the only "scandal." In January 1976, *l'Unitá* published an article "Four unused computers in the Ministry of Justice," with the subtitle "The tax register scandal is repeated!"[681] The article detailed the acquisition of four computers, in 1970, which led to having three different systems for three different functions in the same ministry: a Honeywell system for the central judicial record; an Univac for bibliographic research in judicial sentences and human resources administration; and an IBM for the jail population census. These same computers were quoted in a Red Brigades communication, as discussed in chapter 3.3. However, the Red Brigades documents presented these four computers as effective and dangerous State repression tools, unlike *l'Unità* that stressed these computers were widely underused, and not interoperable. Again, the same mix of causes and consequences for this inefficiency was outlined: the Italian government's incompetence (and its patronage practices) coupled with foreign companies' aggressive tactics led to a very inefficient use of resources.

4.1.4 The Marxist computer scientist and Capital's computer. Seeking a critical use of technology

While project ATENA's failure unfolded, Marxist intellectuals and computer experts continued to discuss computers' political significance. In 1976, Paola Manacorda published *Il Calcolatore del Capitale* (The Capital's Computer),[682] building on her 1973 article. Manacorda performed again the same regulating emotional practice, establishing Technopolitical Resonance with Marcello Cini, Giovanni Berlinguer and the other actors who amplified the Principle of Hopeful Curiosity. Her book emphasized that computers need to be critically addressed from a political perspective, and it

680 See: "Alle Camere Lo Scandalo Dell'anagrafe Fiscale," *Il Corriere Della Sera*, September 8, 1975; "Urge Un'inchiesta Parlamentare Sullo Scandalo Dell'anagrafe Tributaria," *Avanti!*, August 25, 1975; "Scandalo Nell'anagrafe Tributaria?" *La Stampa*, September 4, 1976.

681 "Quattro Computer Inutilizzati al Ministero Della Giustizia," *l'Unità*, September 12, 1976.

682 The article was translated into French and published in *Les Temps Modernes*: Paola Manacorda and Miguel Carrera, "L'intelligence En Miettes," June 1976.

was necessary to create awareness about their use beyond both "positive" and "negative" myths. Manacorda did not explicitly mention emotions in her analysis, but these myths, as we have seen, were essentially the "excessive fears" and "excessive enthusiasm" that Napoleone Colajanni described. Manacorda also criticized capitalist and socialists' deterministic perspectives on technological development. She stressed the importance of human agency, both as major force in the history of computing up till that time, and for its future development.

The Black Box Entanglement was also weakened by Manacorda's book. The first chapters focused on the history of computing, starting with Charles Babbage's Analytical Engine and ending with minicomputers in the 1970s. Manacorda stressed the social and political needs which informed computer developments over time. This showed that computers' development did not follow a linear trajectory, but multiple factors and multiple actors intervened in their shaping. As for the historicization of technology by IBM DirCom, a similar perspective challenged the Black Box Entanglement's foundations, because it denied the existence of a single path to technology development, from which it was possible to fall behind. Manacorda also evidenced capitalism's ideological influence in contemporary technological development. But her historical reconstruction did not aim to show computers were made by the proletariat's "class enemies" like in the IBM Study Group case. It served to further sustain the regulating emotional practice which categorized both overly enthusiastic and overly pessimistic perspectives on computers as undesirable feeling-thoughts.

Manacorda also criticized the Socialist Fear of Falling Behind, as in the 1973 article. After explaining computers' history and function, Manacorda addressed again the theme "Computer mythology," like in the article but more extensively. She identified three main contemporary myths about computers: the problem of freedom, and as a consequence, power; the rationality of decisions, particularly in relation to those who made them and those subjected to them; and the organization of work.[683] According to Manacorda, debates on these three topics remarkably generated "positive" and "negative" myths. The "positive myths" promised democratic distribution of information and power, decision-making rationality, and freedom from repetitive and monotonous work. The "negative myths" concerned privacy violations, increase in technocracy's power, de-personalization in healthcare or education sectors and unemployment.[684] Manacorda's analysis of these myths showed that existing social and political conditions were the most important forces influencing

683 Manacorda, *Il Calcolatore Del Capitale*, 139.
684 Manacorda, 139.

technological development. In other words, human agency was ultimately more relevant than any alleged pre-determined path established by technological development (whether socialist or capitalist). Manacorda again criticized Quiniou, stressing that placing computers in a socialist society was not enough to rid them of their "negative" aspects.

Ultimately, according to Manacorda, it was not possible to foster an "alternative" use of computers, only a "critical" use. To be able to use computers in an "alternative" way required changing the society that used them and the machines' design. Ultimately, Manacorda observed, "perhaps we can find some space to develop tools that are more appropriate for users' actual needs. But we need to give up the guidelines traditionally used in computer development: increase computing speed, save memory, save manpower."[685] She thus called for abandoning scientific socialism's promises and focusing instead on humans' creative and imaginative powers. "Society's real 'information' needs can be met with meetings, debate, the press, and sometimes even with the computer."[686] However, Manacorda concluded, this was "a computer which has not yet been invented."[687]

Il Calcolatore del Capitale was published in the same year as Cini's *L'Ape e l'Architetto*, and similarly sparked mixed reactions in the PCI.[688] Some, while recognizing the topic's relevance and importance, considered it too radical in its conclusions. For example, the book reviewer for *l'Unitá* Mario G. Losano, found its arguments interesting and claimed the book provided a much needed analysis.[689] However Losano was not convinced about Manacorda's view that only a "critical" use of computers was possible nowadays.[690] Manacorda in turn levelled some direct criticism at the PCI. In her book's final chapter, she pointed out that PCI computer debates had changed in recent years. While the 1973 PCI computer conference marked a significant commitment to analyzing computers' societal and political implications, in the second half of the decade, the party focused excessively on the macroeconomic aspects. Computers were mostly discussed as tools to advance

685 "Alcuni spazi possono forse essere ricavati per la progettazione di strumenti piú consoni alle reali esigenze degli utenti purché si rinunci ad assumere come criteri guida della progettazione quelli che finora sono sempre stati assunti: aumento della velocitá di elaborazione, risparmio di memoria, risparmia di manodopera." Manacorda. 205.

686 "I bisogni reali di 'informazione' potranno essere soddisfatti con l'assemblea, con il dibattito, con il giornale, e perfino, talvolta, con il calcolatore." Manacorda. 207.

687 "Un calcolatore che nessuno ha ancora inventato." Manacorda. 207.

688 Both books were part of the series on science and technology curated for publishers Feltrinelli by Cini and Maccacaro.

689 "In Paola Manacorda's book, the critique about using computers is enriched with the critique of their structure: the picture is complete, it becomes more systematic and takes the whole conversation a step forward," "Con il libro di Paola Manacorda, alle critiche sull'uso del calcolatore si aggiungono le critiche alla sua struttura: il quadro si completa, diviene più sistematico e l'intera discussione compie un deciso passo in avanti." Mario G. Losano, "Mitologia Del Calcolatore," *l'Unità*, April 12, 1977. 3.

690 Losano. 3.

Italy's industrialization, and even advocating the development of a local, independent, large-scale computer manufacturer was toned down.

Evidence of this shift are the debates on the national "Calculus Plan," which mobilized a mixture of Socialist Fear of Falling Behind and the Missed Opportunity discourse. A key figure in these debates was Piero Brezzi, director of the PCI electronics committee. In 1976, Brezzi published *L'Industria Elettronica* (The electronics industry). This book underlined PCI proposals for the upcoming Calculus Plan. Lucio Libertini, as also observed by Manacorda, became another notable supporter of this discourse, and published articles in *l'Unitá* about the importance and urgency of investing in the electronics sector.[691]

Brezzi tried to establish some Technopolitical Resonance with the critical perspectives on computers. For example, in his 1975 book *Elettronica e Società* (Electronics and Society), Brezzi observed that "it is certainly useful to reconfirm the concept recently established in modern culture, where science is never neutral. And even about computers, we can say that they could truly help people in every sector, but until today they have been directed at seeking profit, instead of economic and social services planning."[692] The same was re-affirmed in *L'Industria Elettronica*, where Brezzi referenced Giovanni Berlinguer's concluding speech at the 1973 conference. Brezzi remarked how computers risked becoming "the next technological utopia," then reported on Berlinguer's criticism of Quiniou, also stressing the non-neutrality of science.

However, Brezzi was not particularly committed to re-politicizing the micro and macro-politics of computing. In *Elettronica e Società,* he included a collection of writings addressing computer technologies' societal and political aspects. But they were mostly authored by engineers and scientists, for example Norbert Wiener and Alan Turing. Multiple articles by Quiniou were also included. These writings were much more about computer technologies than about society. In this way, Brezzi was once again shifting the focus to a technology-centered perspective, instead of human agency or societal needs. This is particularly apparent when comparing this publication with

691 See: Lucio Libertini, "Nel Mercato Dell'informatica," *l'Unità*, February 28, 1975; Lucio Libertini, "Minacce Sull'elettronica Italiana," *l'Unità*, June 11, 1975.

692 "Certamente è utile riconfermare il concetto, del resto acquisito da non molto nella cultura moderna, per cui la scienza non è mai neutra, ed anche a proposito del calcolatore si puó dire che esso puó davvero aiutare l'uomo in ogni settore, ma che finora è stato piuttosto indirizzato alla ricerca del profitto invece che alla pianificazione dell'economia e dei servizi sociali." Brezzi, *Elettronica e Società*. 93.

edited volumes on computers by Renato Levrero and Paola Manacorda, who include diverse actors and voices.[693]

Ultimately, Brezzi established Technopolitical Resonance with Quiniou rather than with Cini, Manacorda, or Giovanni Berlinguer. His proposal for a Calculus Plan envisioned a classic, Soviet style, State-owned computer industry conglomerate that could compete on the international stage. This conglomerate would be led by Olivetti, and include all the existing relevant national companies, for example SGS-ATES in the microelectronics sector and Telettra in telecommunications. Brezzi also opened the door to multinational companies, provided they were run in strict accordance with State directives. According to Brezzi: "in the computer industry, the primary goal of a 'calculus plan' should be establishing a public owned, national enterprise for large size computers—naturally combining all the workforce and organizational experience of Olivetti, HISI [Honeywell Information Systems Italia], and the small Unidata group."[694]

Unsurprisingly, the more critical Marxist intellectuals and computer experts became increasingly dissatisfied with the PCI's computer plans. In 1977, Renato Levrero edited a book *Che Cos'è l'Informatica* ("What are Information Technologies?"), with essays on the social, political, and technical aspects of computers. The authors mobilized skepticism and disappointment about PCI's plans for computers. Levrero focused on the micro-politics of computing, and wrote a very critical article about the future Italian "Calculus Plan," observing that both European and Italian computer ideas were increasingly subject to US plans and demand. In other words, these plans amplified the Black Box Entanglement's Technopolitical Resonance rather than weakening it. The criticism was mostly based on the PCI's new economic policy, considered too generous to multinational computer companies. This also reflected a shift at the European Union level, which had abandoned the aim to build a "European" computer. Paola Manacorda also contributed to the volume, writing on macro-political aspects. She focused on "rationality," specifically "capitalist rationality" as the main myth surrounding computers. Her essay analyzed the computer production cycle, to examine the mechanisms whereby "the computer is at once a support and a symbol of capitalist rationality.

693 Renato Levrero, ed., *Che Cos'è l'informatica. Storia, Tecnologia, Economia* (Mazzotta, 1977); Manacorda, *La Memoria Del Futuro: Economia, Cultura, Politica Nella Società Informatizzata*.

694 "Per l'industria dei calcolatori, l'obiettivo primario di un "piano di calcolo" dovrebbe essere la costituzione nell'area pubblica di una azienda nazionale per la grande informatica, naturalmente raccogliendo tutta l'esperienza umana e organizzativa dell'Olivetti, dell'HISI e del piccolo gruppo della Unidata." Brezzi, *L'industria Elettronica*. 254.

Therefore, on the mass level, it has come to symbolize a scientist's and technocratic myth which today, in the general crisis of models for a new society, is coming back again."[695]

Both Manacorda and Levrero pointed out a very important problem in the current computer development mode: the absence of a space to take into account the "contradictions" that were the impulse for social change and reshaping class relationships. They showed that computer debates were increasingly de-politicized, also within the PCI. For Levrero, these "contradictions" were not sufficiently considered in the recent PCI debates involving computers. For Manacorda, the "contradictions" were rendered invisible by the very design of computers, which were programmed to reproduce the "capitalist rationality" myth. Similar to the IBM Study Group, also Levrero and Manacorda fostered an identification between the micro and macro-politics of computing, as they stressed these two aspects were profoundly interrelated. However, in the IBM Study Group, this identification resulted in addressing either micro *or* macro-politics, then extending the analysis to the other. As we have seen, this resulted in a de-politicization of discourses about computers and their design. Conversely, Manacorda and Levrero stressed the importance of addressing both the micro *and* macro-political aspects relating to computer development. This kept encouraging a re-politicization of computer debates and design, at a time when the PCI mostly concentrated on computers' industrial and macroeconomic significance.

695 "Il calcolatore si pone come supporto e al tempo stesso come simbolo della razionalitá capitalistica, e quindi, a livello di massa, come simbolo di una mitologia scientista e tecnocratica che oggi piú che mai, nella crisi generale dei modelli di nuova societá, tende a riaffermarsi." Paola Manacorda, "Ideologia e Mitologia Del Calcolatore," in *Che Cos'è l'informatica*, ed. Renato Levrero (Mazzotta, 1977). 37.

4.2 The communist road to computers. Finding a new Utopia against the Black Box Entanglement

The late 1970s shift in PCI computer debates (from the societal and political implications to the macroeconomic and industrial aspects of computing), was part of wider change processes within the party. As mentioned earlier, the gap between the PCI and the grassroots left increased in the 1970s. These were also the years of the government allegiance between the PCI and the Christian Democracy (the "Compromesso Storico," "Historic Compromise"). The more radical perspectives, such as Cini's and Manacorda's, established Technopolitical Resonance with the grassroots left, rather than with the PCI. However, the PCI continued performing emotional practices amplifying the Principle of Hopeful Curiosity's Technopolitical Resonance. This did not happen anymore at the level of specialized computer debates, but in National Congresses.

A crucial figure in this scenario was PCI secretary Enrico Berliguer.[696] His political activity marked the quest for the "Italian road to socialism," inaugurated in post-WWII Italy by Palmiro Togliatti. Together with Antonio Gramsci, Togliatti was one of the founders of the Italian Communist Party, and the man who led the transition from a Marxist-Leninist revolutionary party to the quest for an "Italian road to socialism." At the end of WWII, Togliatti inaugurated a new political course for the party. Communist partisan fighters were asked to lay down their weapons, and start building the "Italian road to socialism." This meant becoming involved in democratic parliamentary politics, and abandoning the idea of establishing communism through a revolutionary struggle (the armed party's notion of "betrayed resistance"). After Togliatti's death, the new leader was Luigi Longo, who had to mediate between two currents emerging within the party: on the one hand, a "moderate" current close to social democracy, headed by Giovanni Amendola; on the other, a "radical" current closer to the grassroots left, headed by Pietro Ingrao. Longo remained the PCI secretary until 1972, facing the students and workers movements' growth in 1968/69, and the first fascist bombings. However, in 1968 Longo suffered a stroke, and in early 1969 he named Enrico Berlinguer as vice-secretary. In 1972, Berlinguer was officially elected party secretary, a position he held until the mid-1980s.

The Italian road to socialism also necessitated an "Italian road to computers." And, as we see in this section, Enrico Berlinguer established Technopolitical Resonance with his brother Giovanni, rather than with Piero Brezzi, when he talked about computers. In his speeches and writings, Enrico Berlinguer performed a regulating emotional practice aimed to position the party mid-way between

696 Pons, *Berlinguer e La Fine Del Comunismo*; Chiara Valentini, *Enrico Berlinguer* (Feltrinelli, 2014).

the Black Box Entanglement and the grassroots left "anti-technology" attitude. These emotional practices were informed by his "Fear of Falling Inside" both Soviet communism and US capitalism. Furthermore, Berlinguer also performed mobilizing practices encouraging hope in the socialist use of machines, and fostering Scientific Curiosity. In other words, Enrico Berlinguer also amplified the Principle of Hopeful Curiosity's Technopolitical Resonance. Whereas the PCI's specialized computer debates were increasingly de-politicized, Enrico Berlinguer fostered a re-politicization of computer debates within the party, particularly on the macro-political level.

4.2.1 Between "catastrophic consequences" and "catastrophist perspectives." Technology promises and political concerns

At the 1973 PCI computer conference, Giovanni Berlinguer had highlighted two factors informing the party's computer vision: the PCI was certainly against the "mythologization of computers and technology"; but it was also against the "romantic and petty-bourgeois anti-technology attitudes sustained today by restrictive interpretations of Marxism, claiming that science is totally embedded in capital."[697] This could be seen as a reference to perspectives like the IBM Study Group's. During the conference, Giuliano Bianchi also mentioned the IBM Study Group book *Capitale Imperialistico e Proletariato Moderno.*[698] Bianchi stressed how the document greatly overstated the real influence of computers on the State, showing the "power of the computer! It manages to turn even criticism into yet another glorification of its myth."[699]

Giovanni Berlinguer also questioned the technological developments in the Soviet Union. He recollected a 1971 official party visit to the Soviet Union, when he visited Akademgorodok, a city developing advanced computer applications. However, when back in Italy, Berlinguer found out that during his visit Kruschev had died, and Soviet citizens still had absolutely no clue about the event. This showed that, even in socialist countries, being technologically advanced did not necessarily brought about a better life.

697 "L'antimacchinismo di impronta romantica e piccolo-borghese, sostenuto oggi da interpretazioni restrittive del marxismo, secondo cui la scienza sarebbe totalmente inglobata nel capitale." Berlinguer, "Conclusioni." in AA.VV., *Informatica, Industria, Università, Programmazione*. 216.

698 Many Italian Marxists interested in computers probably read the book, as it is included in Manacorda's and Brezzi's bibliographies.

699 "Potenza del calcolatore! Che riesce a volgere a fini di esaltazione del proprio mito anche le affermazioni di chi lo vorrebbe contestare." Bianchi, "Calcolatori, Pubblica Amministrazione, Riforma Regionale." 131.

Giovanni Berlinguer's remarks on computers performed mobilizing and regulating emotional practices, amplifying the Principle of Hopeful Curiosity's Technopolitical Resonance. Neither excessive enthusiasm (like the Soviet Union), nor excessive concern (like the grassroots left's anti-technology positions) were appropriate emotional responses to computers. Rather, it was important to craft a "PCI road to computers" which could take advantage of techno-scientific developments without falling for their "mystifications."

Giovanni Berlinguer made these observations at a time when the PCI was promoting greater distancing from both the "revolutionary left" and from the Soviet Union. During the days of PCI's first computer conference (11-13 October 1973) not only the "PCI road to computers" but also the "Italian road to socialism" was changing forever. On October 12, a fundamental article by PCI leader Enrico Berlinguer was published in the party magazine *Rinascita*.[700] The article is famous for having introduced the "Historic Compromise," in other words a government alliance, with Aldo Moro's Christian Democracy (DC), the ruling party and the PCI's traditional opponent. The article was the last of a three-part series, that started with a reflection on the recent military coup against Salvador Allende's socialist government in Chile. The central question Berlinguer addressed in the essays was how to build an Italian "democratic way to socialism," learning from what had happened in Chile and considering the global political situation.

Enrico Berlinguer's proposal for an Historic Compromise was informed by two different sources of Fear of Falling Inside. On the one hand, the fear of falling inside capitalism. This concern became particularly pressing after the US-backed military overthrow of Allende's government, because the PCI (and many other socialists) felt a special proximity with Chile.[701] Communists feared that something similar might happen in Italy if the PCI became too powerful. This fear escalated due to neofascist movements planting bombs in public spaces around the country, and the ambiguous involvement of secret services sectors in these and similar events.[702] Yet the PCI was also afraid of falling inside the "Soviet way to socialism." Indeed the PCI increasingly distanced itself from the Soviet Union Communist Party, but this was a complex process.[703] Squeezed between these two pressing concerns, the PCI made some decisions which proved very unpopular with the rest of the

700 Enrico Berlinguer, "La Proposta Del Compromesso Storico," *Rinascita*, October 12, 1983.

701 Historians of computing may be interested in whether the PCI knew about the famous "Project Cybersyn" (Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile*. MIT Press, 2011). My research suggests they did not, as they would have included it in their frequent references to Chile. In 1980, scholars published a book about Project Cybersyn, but with limited circulation. De Cindio, Fiorella, and Giorgio De Michelis, eds. *Progetto Cybersyn: Cibernetica per La Democrazia*. CLUP/CLUED, 1980.

702 Ginsborg, *A History of Contemporary Italy - Society and Politics 1943-1988*. 333-335.

703 Pons, *Berlinguer e La Fine Del Comunismo*.

left, in particular the Historic Compromise with the DC. These decisions ended up fueling the traditional conflict between a "reformist way to socialism" embodied by the PCI, and a "revolutionary way to socialism,"[704] embodied by the grassroots left. Therefore, not only the USA and the USSR, but also the Italian grassroots left were a concern for the party.

This complex political situation was mirrored in the emotional practices Berlinguer performed in his statements on scientific and technological development. The "fear of falling inside capitalism" led to mobilizing Scientific Curiosity, by openly seeking the scientific community's support for his planned Italian road to socialism. For example, in the Rinascita articles on Chile and the Historic Compromise, Berlinguer's call for national unity against the anti-democratic forces threatening the country explicitly sought support from the "forces of science [and] technique." He also warned that technology misuse, such as by the USA, could have "catastrophic consequences," for example an atomic war.

The conflict with the revolutionary left was also central in Berlinguer's speeches. He often criticized what he called the revolutionary left's "catastrophist perspective" exemplified by the IBM Study Group's book. For example, in 1974, Enrico Berlinguer gave a speech for the upcoming national congress, "The line and the proposals of the communists to exit the crisis and build a new Italy." Berlinguer criticized the grassroots left's negative visions of technology, described as "pseudo-revolutionary attitudes denying [the usefulness of] science and technology […], considered [instead] as mere exploitation tools in the hands of the ruling class."[705] He stressed how "catastrophism" would not solve the current challenges facing the working class. In doing so, he performed a regulating emotional practice which categorized "catastrophist" perspectives as undesirable emotions.

The dichotomy between "the catastrophic consequences" and the "catastrophist perspectives" became central in Enrico Berlinguer's statements on science and technology in the 1970s. For example, in his opening speech for the XV PCI National Congress (1979), titled "To unite the country and save it from the crisis," Berlinguer once again stressed the possible "catastrophic consequences" of technology misuse, and harshly criticized the left's "catastrophist attitude"

704 Not necessarily an "armed revolution," perhaps a "social revolution."

705 "Vi sono atteggiamenti pseudo-rivoluzionari di negazione dello sviluppo produttivo, della scienza e della tecnica, e persino del patrimonio culturale, tutti considerati puri strumenti del dominio delle classi sfruttatrici." Enrico Berlinguer, "La Linea e Le Proposte Dei Comunisti per Uscire Dalla Crisi e Costruire Una Nuova Italia," *l'Unità*, December 11, 1974. 12.

towards technological development.[706] Berlinguer emphasized how, "We, the communists, were the first to criticize and denounce the distorted use, sometimes openly inhuman, of the huge technological conquests, which sometimes produce disastrous outcomes. But we strongly reject any catastrophism, any ideology denying the positive value of science."[707] This was both a regulating and a mobilizing emotional practice: it regulated "catastrophist perspectives" as undesirable, attitudes which had to be "strongly rejected"; and it mobilized Scientific Curiosity by stressing that scientific knowledge could certainly be misused, but ultimately had a "positive value".

In the debates following the speech, this stance was echoed by Roberto Fieschi,[708] who delivered the most extensive talk on technology. Fieschi established Technopolitical Resonance with Berlinguer, because he also mobilized Scientific Curiosity and regulated the left's "catastrophist perspectives" as undesirable. He started by mentioning the Three Mile Island nuclear accident that had happened the week before in the USA: "this very accident at the Pennsylvania nuclear plant is a paradoxical demonstration of the fact that we need more science to not fall into a precipitous technologism. Our approach is to consider these problems, rejecting any ideology denying the positive value of science"[709] he observed, literally quoting Berlinguer. Then he pointed out how "It is important that our party distances itself from the scientist-technocratic vision which entrusts human well-being to linear scientific progress. But it is also important to denounce scientific ignorance and irrational or catastrophic-romantic visions. They act as a paralyzing mass ideology, while economic and political powers keep using science to influence the country's development in a concrete but uncontrolled, often chaotic, way."[710] The problem with this vision was not only ignoring the merits of technology, but also preventing the development of more poignant criticism. Fieschi concluded, "the period of uncontrolled growth has ended. We must seek controlled, selective growth. For this reason, we need appropriate technologies within an appropriate strategy."[711]

706 Enrico Berlinguer, "Per Unire Il Paese e Salvarlo Dalla Crisi," *l'Unità*, March 31, 1979.
707 Berlinguer.
708 PCI delegate from Parma, and later member of the PCI Central Committee, physicist by profession, and contributor to the magazine *SE-Scienza/Esperienza*.
709 "Lo stesso incidente della centrale nucleare della Pennsylvania dimostra paradossalmente come vi sia bisogno di più scienza per non cadere in un tecnologismo avventato. Le nostre tesi considerano questi problemi, respingono ogni ideologia negatrice del valore positivo della scienza." Roberto Fieschi, "Gli Interventi Del Dibattito Sul Rapporo Di Berlinguer," *l'Unità*, April 2, 1979. 3.
710 "È importante che il nostro partito, pur prendendo le distanze dalla posizione scientista-tecnocratica, che affida al progresso lineare della scienza il benessere dell'umanità, denunci sia l'ignoranza in campo scientifico sia le posizioni irrazionalistichee e catastrofico-romantiche. Esse agiscono come ideologia paralizzante di massa, mentre il potere economico e politico continua a servirsi dei risultati della scienza per influire in modo concreto ma incontrollato, spesso caotico, sullo sviluppo del Paese." Fieschi. 3.
711 "Il periodo della 'crescita incontrollata' è finito, bisogna andare a una crescita controllata, selettiva. Perció occorrono tecnologie appropriate nel quadro di una stratgia appropriata." Fieschi. 3.

These early mentions of computers and technological development in Enrico Berlinguer's speeches sometimes seemed to be more Resonant with the Black Box Entanglement and Socialist Fear of Falling Behind than with the Principle of Hopeful Curiosity. In this sense, his perspective was de-politicizing. When he called out the "catastrophist" perspectives on technology, he was performing a regulating emotional practice more akin to the US military-industrial complex calling Berkeley Free Speech Movement protesters "doomsayers," unlike Manacorda's more balanced approach. Strong terms such as "catastrophist" denoted that pessimist emotions on technological development were not only undesirable, but should be excluded from political debates. Furthermore, at times Berlinguer mobilized a certain Socialist Fear of Falling Behind. For example, in his 1974 speech, he stressed the centrality of investing in "vanguard" technologies (i.e. electronics) to "ensure the competitiveness of the Italian industry," but did not discuss these investments' societal and political implications. In this sense, he established Technopolitical Resonance with Piero Brezzi, rather than with Manacorda.

These 1970s allusions to technology, however, were all brief, and it seems ideological and political needs prevailed over a personal engagement with these topics. In the 1970s, distancing the PCI from the revolutionary left was a more pressing need for Enrico Berlinguer, than engaging with them on a dialectic level. And it was also politically essential to publicly support the PCI electronic committee and its proposed Calculus Plan. As Enrico Berlinguer's engagement with science and technology increased, so did the Principle of Hopeful Curiosity's Technopolitical Resonance in his speeches, fostering a re-politicization of computer debates.

4.2.2 There is no alternative (to democratic socialism). Political promises and technology concerns

Between the late 1970s and the early 1980s, Enrico Berlinguer was working on a new political project: the "Democratic Alternative," which entailed re-positioning the PCI as a party close to workers issues, rather than looking for centrist allegiances. As we have seen, in 1978 the Christian Democracy leader Aldo Moro was kidnapped and killed by the Red Brigades. His death marked the Historic Compromise's symbolic end, as Moro alongside Berlinguer was its main supporter.[712] The following year, the Historic Compromise officially ended. In December 1981, Berlinguer also established distance between the PCI and the Soviet Union, stating that "the propulsive push for

712 As Enrico Berlinguer faced criticism from the left, so did Aldo Moro from the right: the Historic Compromise was unpopular on both sides.

societal renewal which came from Eastern Europe is over." This act, popularly known as "lo strappo" (the snatch), was spurred by the Soviet repression of the Solidarność movement in Poland, but already anticipated in 1980 when Berlinguer did not attend the international communist parties meeting in Paris, instead going on an official visit to China.[713]

The early 1980s were marked by a parallel process of internal distension in Italian politics, and external tension on the geopolitical level. At a national level, the wide repression enforced after the events of 1977 and 1978[714] caused many left-wing revolutionary organizations to dissolve, and generically weakened radical social movements. On the global level, Cold War animosities returning between the USA and the USSR fueled uncertainty and anxiety about the future. In this context, Enrico Berlinguer presented the PCI as a party capable of recognizing people's concerns but also willing to imagine a positive outcome for the future. He increased his personal engagement with specific social groups, particularly factory workers, youth, and women. And he coupled this engagement with increasingly mentioning computers and technological development. In 1982, Berlinguer addressed the Italian Communist Youth Federation (Federazione Giovanile Comunisti Italiani, FGCI) congress, inviting them to organize a conference with a "futurology" theme. The idea was to invite experts from various research fields to discuss the profound changes facing society. The conference did not happen. In this period Berlinguer also established a personal relationship with the new Olivetti CEO, Carlo De Benedetti.[715]

The XVI PCI National Congress (1983) saw an increase in references to computers and to science and technology in general.[716] Criticism of the Black Box Entanglement was a key topic, as shown by the numerous references to the potentially destructive consequences of technology misuse and the calls for greater State investment in the technology sector. The congress opened with a paper "The proposal of an alternative for change."[717] This started by noting that the world was crucially changing. On the one hand, incredible progress had been achieved in people's standard of living. But, on the other hand, "there is an accumulation of disturbing events, regressive pushes, even destructive ones."[718] From the very beginning there was an explicit mobilization of fear, as the

713 Pons, *Berlinguer e La Fine Del Comunismo*.
714 In 1977 there was a massive increase in leftist youth protests, known as "il movimento del '77". See chapter 5.
715 Paolo Bricco, *L'Olivetti Dell'ingegnere* (Bologna: Il Mulino, 2014).
716 Scientist Rita Levi Montalcini, who won the Nobel prize for medicine three years later, was personally invited to attend, but politely declined, thanking Berlinguer for his invitation and interest. *l'Unitá*, March 7, 1983.
717 Comitato Centrale del Partito Comunista Italiano, "La Proposta Di Alternativa per Il Cambiamento," *l'Unità*, November 28, 1982.
718 "Si sono però accumulati anche fenomeni Inquietanti, spinte regressive e persino distruttive." Comitato Centrale del Partito Comunista Italiano.

communists stressed the destruction that nuclear weapons could cause. But other concerns were also underlined, including the centralization of technological know-how in a few multinational companies and States. However, the PCI argued that such centralization was not an unavoidable, "objective" process stemming from science and technology functioning: science and technology could also be used for positive purposes. The paper called for a scientific and technological research policy, and for specific plans in the technology sector. It also highlighted that Italy was unprepared to face the changes brought about by contemporary scientific and technological developments. Italy's techno-scientific delay had created subordination and dependence and was a barrier to economic and civic development, and to any struggle for change in general.

This claim did mobilize the Socialist Fear of Falling Behind, and implies a deterministic tendency in the PCI discourse. However, Berlinguer's opening speech at the PCI congress powerfully amplified the Principle of Hopeful Curiosity's Technopolitical Resonance. Berlinguer stressed the centrality of human agency in shaping technological development, while pointing out the societal and political conquests across the world. Scientific Curiosity also remained central, together with the critique of science and technology misuse. These emotional practices powerfully fostered a re-politicization of computer debates, as they engaged with technology from a critical perspective, stressing the centrality of political choices in orienting future outcomes.

Berlinguer's speech focused on the PCI initiatives and proposals to face "the risks for the economy and the State, and the great threats to peace in Europe and in the world."[719] Berlinguer observed they were in an extraordinary epoch for three reasons: first, the notion of "humanity" was no longer tailored to the "Western male," as new subjectivities were becoming more relevant in the global political arena, for example women, or people in developing countries; second, the world was undergoing a technological and scientific revolution, but its impact was still an open question: at the time it was not possible to judge it as absolutely "good" or "bad"; third, humanity also faced potential destruction from atomic weapons. In order to avoid such a danger and drive human progress toward a positive outcome, it was necessary to unite those not wanting to engage in the current game of mutual destruction between the two opposing Cold War factions.

Regarding Scientific Curiosity, ten years after the Historic Compromise *Rinascita* article, Berlinguer called once again for support from the non-aligned, the Catholics, and the scientific

719 Enrico Berlinguer. "L'iniziativa e Le Proposte Dei Comunisti Italiani Di Fronte Ai Rischi per l'Economia e per Lo Stato e Alle Gravi Minacce Alla Pace in Europa e Nel Mondo." l'Unità, March 3, 1983.

community. He stressed the significance of scientific and technological research to overcome the Italian crisis, including investing in the computer sector as one of the key industrial sectors. He mentioned computers on different occasions, particularly when discussing how to improve specific sectors of the economy (for example industry and agriculture), but also public administration and working conditions in general.

The congress debate shows how the Principle of Hopeful Curiosity was Resonating within the party, in an unprecedented way. At previous PCI National Congresses, computers remained a rather marginal issue: Berlinguer's comments were usually not addressed by the participants. Now, the congress debate was also enriched by new reflections on the theme, highlighting the importance of technological development, and particularly computers.[720] But so was the human agency's centrality in technological development. For example, Nicola di Matteo[721] stressed the centrality of workers' agency in evaluating technological development: "It is not necessarily the case that more refined technologies also imply better working conditions. At SEVEL, productive efficiency is coupled with workloads and timings which are exasperating, while the wages are around 150,000 lire less than the sector's average."[722] Another extended reflection came from Giovan Battista Gerace, who addressed the computer's role in the Italian economy and society. Gerace was professor of Information Sciences at the University of Pisa, and had worked on the Calcolatrice Elettronica Pisana (CEP).[723] In his conference speech he remarked on the importance and urgency of Italy making greater computer investments. But he also stressed the centrality of human agency in technological development, "We must find a new mechanism for development, which can link scientific progress to an increase (not a decline) in societal well-being. But we should not fall into the bureaucratic attitude and dirigisme which in the East led to the stagnation of productive forces making little use of the new scientific conquests."[724]

720 Germano Marri, Vannino Chiti, Alfredo Reichlin, Antonio Bassolino (*l'Unitá*, March 4, 1983), Luigi Castagnoli, Piersandro Scano, Achille Occhetto, Antonio Giallara (*l'Unitá*, March 5, 1983), Gianni Grottola (*l'Unitá*, March 7, 1983).

721 A factory worker at the FIAT SEVEL plant in the Abruzzo region.

722 "Alla domanda se le straordinarie novità della rivoluzione scientifica e tecnologica porteranno o no miglioramenti nella qualità della vita, lo posso rispondere, partendo dall'esperienza concreta della fabbrica dove lavoro, che non è affatto detto che a tecnologie più raffinate corrispondano sempre condizioni di lavoro più avanzate. L'efficienza produttiva, infatti, alla SEVEL si accompagna a ritmi e carichi di lavoro esasperanti, mentre il salarlo medio è di circa 150 mila lire mensili inferiore al salario del settore metalmeccanico." Nicola Di Matteo, "La Prima Giornata Di Dibattito Politico," *l'Unità*, March 4, 1983. 7.

723 Gerace was also involved in public debates about technology, contributing to the magazine *Quindici* (see section 2.3) and *Critica Marxista*.

724 "Occorre trovare un nuovo meccanismo dello sviluppo che all'impiego dei progressi della scienza faccia corrispondere un aumento (e non una riduzione) del benessere sociale, senza cadere in forme di burocratismo e dirigismo che nei paesi dell' Est hanno prodotto ristagno delle forze produttive e scarso Impiego delle nuove conquiste della scienza." Giovan Battista Gerace, "I Delegati Alla Tribuna Del Palasport," *l'Unità*, March 5, 1983. 8.

After the National Congress, the PCI promoted computer development more actively at the European level, challenging the Black Box Entanglement in a much larger political arena. These were also the "Eurocomunismo" (Eurocommunism) years, an allegiance between the French, Spanish, and Italian communist parties proposed by Enrico Berlinguer, and started in 1976. For the 1984 European elections, the PCI called for a joint European program to expand advanced technologies such as information processing, communications, automation, mobility, and biotechnology. And a year later they advocated rejecting Reagan's Strategic Defense Initiative as a model for Europe. Instead, they opted for the EUREKA project, founded in July 1985 to create a European initiative for applied technological research.

4.2.3 "Orwell was wrong." The communist 1984

In the mid-1980s, the connection between fear and technology was explicitly discussed within the Italian Communist Party. In December 1983, l'Unitá published a special insert on the upcoming year 1984.[725] Intellectuals, politicians, and researchers were invited to write about what *l'Unitá* called "Orwell's prophecy." The main themes were the atomic bomb, computers, and democracy. The subtitle asked "what will the man of the 2000s look like? "[726] This special issue shows a change in the relationship between the PCI and computer-related fears. First, fear of technology was no longer seen as an undesirable emotion. Second, new fears were discussed, particularly the fear of being controlled by computers. Furthermore, in this special issue Enrico Berlinguer powerfully amplified the Principle of Hopeful Curiosity's Technopolitical Resonance, sanctioning that the PCI road to computers had to counteract both the Black Box Entanglement and Socialist Fear of Falling Behind.

Fear was a recurring theme in the articles. "He [Orwell] was afraid of power, we are afraid of chaos," wrote Gianni Badget Bozzo, a theologian reflecting on the connections between Orwell and the Christian tradition.[727] A similar historical connection was analyzed in an interview "And I tell you about the fear of the year 2000" with Jacques le Goff.[728] The French historian drew a parallel between the Middle Ages' fears of the year 1000 and contemporary apocalyptic narratives of the

725 "1984 (Special Insert)," *l'Unità*, December 18, 1983.
726 Indeed they referred to "man" as in "male": of the many contributors, only two were women, and no articles covered gender themes.
727 Gianni Badget Bozzo, "Lui Temeva Il Potere, Noi Temiamo Il Caos," *l'Unità*, December 18, 1983.
728 Jacques Le Goff, "E Io vi Racconto La Paura Dell'anno Mille," *l'Unità*, December 18, 1983.

atomic bomb and computers' misuse. Together, these articles suggested a regulating emotional practice. They showed that contemporary technology fears were not an "inappropriate" emotion but could be categorized as human reactions to the unknown. This was a shift from Enrico Berlinguer's "catastrophic consequences/catastrophist perspective" dichotomy. In this period the PCI came closer to the grassroots left's concerns, but not necessarily *thanks* to the grassroots left: these concerns had become a wider societal issue, given the reignited Cold War tensions and symbolic year 1984. This fostered a re-politicization of computer debates, as new themes and new perspectives entered the conversation.

Many authors discussed the fear of computers being used to control the population. "Meanwhile in the USA the big fear is born," wrote Gianfranco Corsini on the potential misuse of computers.[729] New York Times journalist David Burnham was often mentioned in this article, in relation to his book *The rise of the computer State.*[730] The book examined control and surveillance through computers, pointing out their potential misuse by institutions like the US National Security Agency. David Burnham also contributed to the special issue with an article "The risk is in the telephone."[731] In it he warned about the imminent dangers if States owned all the technological apparatus, pointing out the need to decentralize data centers as much as possible in order to avoid fostering authoritarian State tendencies. This contribution is noteworthy as Burnham seemed to imply it was preferable to have private companies—rather than governments—control technological infrastructures. However, a similar statement can be explained from at least two angles. First, it could be taken as criticism of non-democratic States like the Soviet Union. Second, the PCI's "moderate faction" was growing in the 1980s, leading to a gradual but visible increase in the acceptance of capitalist principles.

Fear of control by computers was also addressed in an article by Mario G. Losano, who ironically asked "Here not even the Postal Service works. Can you imagine the electronic State?"[732] Losano mobilized both amusement and concern, pointing out that the Italian State's inefficiency was a much more problematic issue than its potential transformation into Orwell's Big Brother. Losano agreed that, in theory, a modern State might have the tools to successfully establish a Big Brother, similar to what Orwell described. However, as Losano reminded, "fear of technology should not let us overlook the importance of politics, and, in particular, the importance of democratic control over

729 Gianfranco Corsini, "In America Invece Nasce La Grande Paura," *l'Unità*, December 18, 1983.
730 David Burnham, *The Rise of the Computer State* (Random House Inc., 1983).
731 David Burnham, "Se Il Rischio è Nel Telefono," *l'Unità*, December 18, 1983.
732 Mario G. Losano, "Qui Non Funzionano Le Poste, vi Immaginate Lo Stato Elettronico?," *l'Unità*, December 18, 1983.

those in power."[733] He referred to General de Lorenzo, the mind behind a failed military coup in the 1960s,[734] who shook Italian democracy with very little technological means.

The Black Box Entanglement was indirectly addressed by professor of psychology Cesare Musatti.[735] "I am not afraid of the Third World War," he claimed in the article's title. Musatti stressed that the real danger for the future was not a nuclear catastrophe, but States not having technology and technological know-how: "It is in this way, like in the past, that civilizations disappear," he observed in a "doomsayer" sounding way. His article challenged the Black Box Entanglement, by arguing for a stronger decentralization of existing computer infrastructures, and by stressing the dangers arising from a lack of technological knowledge.

The special issue's highlight was a lengthy interview with Enrico Berlinguer. It was called "The left towards the year 2000" and subtitled "Orwell was wrong: the computer opens new frontiers."[736] Berlinguer addressed the same themes as the special issue: democracy, computers, and the atomic bomb. This interview powerfully exemplifies Berlinguer's criticism of the Black Box Entanglement, and, even more so, amplified the Principle of Hopeful Curiosity's Technopolitical Resonance.

Berlinguer pointed out the outstanding results achieved in recent decades by three social movements: anti-imperialistic, workers, and women's movements. This was a powerful statement against the macro-politics of the Black Box Entanglement, and favoring the Principle of Hopeful Curiosity: it was not thanks to the computer revolution that human lives had improved, but because of interconnected social and political revolutions. In other words, human agency, and not technology, was the major force for societal and political change. Berlinguer also observed that overall, "we are facing a real *crisis in the world*. We live in a time that is supreme in many aspects of humanity's history, both for its possibilities and risks."[737] But these references to contemporary concerns and fears were meant to sustain a wider mobilizing emotional practice, which amplified the Principle of Hopeful Curiosity. Berlinguer stressed that contemporary concerns should not stop

733 "Tuttavia il timore della tecnologia non deve portare a sottovalutare il peso della politica, e, in particolare, il peso del controllo democratico sul potere." Losano.

734 The so-called "Piano Solo." See: Ginsborg, A History of Contemporary Italy - Society and Politics 1943-1988. 276-279.

735 Cesare Musatti, "Non Ho Paura Della Terza Guerra Mondiale." *l'Unità*, December 18, 1983.

736 Enrico Berlinguer, "Orwell Si Sbagliava, Il Computer Apre Nuove Frontiere," *l'Unità*, December 18, 1983. A later publication of the interview is: Enrico Berlinguer and Ferdinando Adornato (eds.), *La Consapevolezza Del Futuro. L'intervista Sul 1984.* (Aliberti editore, 2012).

737 "Siamo di fronte a una vera e propria *crisi del mondo*. Viviamo in un'epoca per molti aspetti suprema nella storia dell'uomo, sia per le possibilità che per i rischi." Berlinguer. 36. Italics in original.

people from always working on alternatives: “we must be careful that fear of total destruction does not become so obsessive and pressing to prevent us from thinking about something else. That would be a victory for the strategists of terror.”[738] Keeping alive the constant threat of a global war was also a way to preclude imagining alternative solutions to existing conflicts, Berlinguer pointed out.

The micro-politics of the Black Box Entanglement were also shaken, as Berlinguer argued that scientific education and technological know-how were crucial tools for overcoming contemporary fears -thus black boxed technologies were implicitly unwelcome. Not because technological progress would automatically foster a socialist revolution, as scientific socialism claimed. But to exercise agency over scientific and technological innovation, which, for better or for worse, was a crucial part of the contemporary world. Berlinguer argued that technical revolutions should be considered “neutral” in principle. Microelectronics could certainly increase and strengthen the US military-industrial complex’s power, but could also cause a great knowledge diffusion in humankind. Therefore, in order to face the electronic era “we must, first and foremost, acquire knowledge on these phenomena at all levels […] to stimulate, orient, control and influence innovation so that workers and citizens’ vital needs are not sacrificed.”[739] This statement again underlined the primacy of the social over the technological: improving the country’s technological know-how was more than just not falling behind other Western Bloc countries’ economic and industrial sectors. It was mainly a political need informed by the increased societal significance of technology.

This special issue on the year 1984 powerfully encouraged a re-politicization of computer debates in the PCI. The party embraced new concerns on technology misuse, thus opening up the debate to political actors who had expressed the same concerns in the past, but were marginalized. Meanwhile, Enrico Berlinguer promoted a critical, political use of scientific and technological discoveries. Ultimately, there was one way for Berlinguer to address crisis and fear in the contemporary highly technological world: “we must be aware that these dangers exist, and also that they always show up in different ways throughout history. But we also need to have the courage to work towards a long-term Utopia and achieve the goal of always using new scientific discoveries to

738 “bisogna stare attenti che la paura della distruzione totale non diventi così ossessiva e stringente da impegnare tuttele energie e impedire di pensare ad altro. Questo sarebbe una vittoria degli strateghi del terrore.” Berlinguer. 37. The “strategists of terror” were the US military-industrial complex and other actors fueling Cold War tensions.

739 “Innanzitutto dobbiamo impadronirci della conoscenza di tutti questi fenomeni, a tutti I livelli. Su questa base bisogna poi definite politiche adatte a stimolare, a orientare, controllare e condizionare le innovazioni in modo che non siano sacrificate esigenze vitali dei lavoratori e dei cittadini.” Berlinguer. 38.

improve men's lives and, at the same time, be mindful of guiding economic and social processes."[740] Neither hatred nor enthusiasm for technology, but hope in the "non-guaranteed character" of Utopia[741] and trust in scientific knowledge, were the basis for building the "PCI road to computers."

4.2.4 A (non) emerging political question. Computers and the final PCI debate

Indeed, Orwell was wrong and Berlinguer was right: the year 1984 did not mark the fulfillment of any prophecy. Nonetheless, it was the symbolic end of the PCI road to computers. On June 11 Enrico Berlinguer died, after suffering a brain hemorrhage during a public speech in Padua. Berlinguer's death was a tragic and deeply emotional moment for the whole country. His funeral services in Rome were attended by around 1 million people.[742] At the European elections on June 17, the PCI for the first time in history won the highest number of votes in Italy, 33.33%.[743] *L'Unita* published a moving special issue to commemorate Berlinguer. His commitment to science technology was also visible in the special issue. Among the messages of condolence published by l'Unitá, the only one from a businessperson was by Carlo De Benedetti, Olivetti's CEO.[744] Umberto Colombo, president of ENEA (the national energy committee), wrote a message explicitly praising Berlinguer's efforts to promote science and technology and his "sensitivity for scientific and technological research."[745] These were powerful mobilizing emotional practices, evidencing Berlinguer's Scientific Curiosity and thereby mobilizing it in the reader.

After Berlinguer's death, the party leadership went to Alessandro Natta, who continued working on the "democratic alternative" line. By the late 1980s, there was more disagreement in the PCI and the criticism of the Black Box Entanglement gradually lost momentum. The 1986 National Congress continued to promote technological development as a strategic sector for investment, especially new technologies, yet still upheld a critical attitude. For example, in the "Thesis for the XVII Congress," the PCI highlighted the "strident contrast between the possibilities offered by scientific and technological development and so much persistent anguish and significant unemployment even in

740 "Bisogna avere il coraggio di una Utopia che lavori sui 'tempi lunghi' per raggiungere l'obiettivo di utilizzare sempre nuove scoperte scientifiche per migliorare la vita degli uomini e, nello stesso tempo, di guidare consapevolmente I processi economici e sociali." Berlinguer. 49.
741 Ernst Bloch, *The Principle of Hope* (MIT Press, 1986).
742 Italy's population was around 56 million at that time.
743 The highest result was in the 1976 national elections, when the PCI obtained 34.37% of preferential votes in the Deputies chamber and 33.83% in the Senate.
744 "Mancherai a Tutti," *l'Unità*, June 12, 1984. 10. l'Unita may have received other messages from industrialists, however De Benedetti's was the only one published, testifying to the privileged relationship between the PCI and Olivetti.
745 "Mancherai a Tutti." 9.

the most developed countries."[746] Nonetheless, the Principle of Hopeful Curiosity did not resonate for long in PCI national debates (though some PCI members called for its return).

In 1988, the new party leader was Achille Occhetto, who at that point was closer to the PCI's moderate faction. At the last PCI national congress in 1989, computers played a marginal role. For example, the paper introducing the congress "The ABC of the new path,"[747] contained 28 keywords to guide the debate: none referred to computers or technological innovation. Some PCI members pointed out this lack of interest and criticized the PCI central committee, such as the Rome PCI Federation that amplified the Principle of Hopeful Curiosity. They called for going back to Berlinguer's vision on science and technology, because it was dialectic and considered both risks and potential. According to the Rome Federation, many new technologies needed to be invented, and that was the communists' task.[748] However, this critique did not have a significant impact on refueling PCI debates on computers at the national level.

Following the fall of the Berlin Wall and the Soviet Union's dissolution, the PCI changed forever. In 1990 they held a special congress in Bologna. The main question debated was whether the PCI should have implemented a constitutional phase to create a new political entity. On one side was the "yes" group, headed by the moderate faction and party secretary Achille Occhetto. On the other side, the "no" group, consisted of PCI radicals like Pietro Ingrao, but also former secretary Alessandro Natta. They argued that the Italian road to communism was not over. A third, minority current, also argued "no," but from a pro-Soviet perspective.

The "Documents for the special congress" discussed the new path envisioned for the party, but technology did not play a significant role.[749] This lack of interest in technology again created discontent. The Italian Communist Youth Federation (the party's youth section, FGCI) wrote a paper stating the need to readopt Berlinguer's dialectic stance on science and technology, and address these themes. They thus tried to establish Technopolitical Resonance with their comrades,

746 "Stridente contrasto tra le possibilita` offerte dallo sviluppo scientifico e tecnologico e il persistere di tante angustie e di una vasta disoccupazione anche nei paesi piu` sviluppati." Partito Comunista Italiano, "Tesi per Il XVII Congresso Del PCI," September 1986, Archivio Istituto Gramsci Emilia-Romagna.

747 Partito Comunista Italiano, "L'ABC Del Nuovo Corso: 28 Parole Chiave per Intervenire Nel Dibattito Del 18 Congresso e Contribuire al Programma Politico Del PCI," 1989, Archivio Istituto Gramsci Emilia-Romagna.

748 In: XVIII Congresso Nazionale, Mozioni Approvate nei Congressi Provinciali, Archivio Istituto Gramsci Emilia-Romagna.

749 Documenti per il Congresso Straordinario del PCI, XIX Congresso Nazionale, Archivio Istituto Gramsci Emilia-Romagna.

based on the Principle of Hopeful Curiosity. But they were not able to engage with the party's higher levels.

Notwithstanding the disinterest shown by the new party leadership, technological development ended up being one of the contentious issues in the fight for the PCI's future. Occhetto opened the special congress with a speech "A new beginning: the constituent phase of a new political formation."[750] He mentioned the contrast between societal inequalities and technological development, which in Occhetto's view should have been solved through greater collaboration between public and private entities. But, overall, technology did not really play a role in his vision. This omission prompted two eminent members of the larger "no" side to speak out.

The first was Sergio Garavini, a worker unionist and party member since 1948. He mobilized skepticism in Occhetto's vision by pointing out the leader's failure to include technology in his political reasoning. Garavini thus powerfully encouraged a re-politicization of computer debates, arguing, "today the working class is fragmented and articulated, and as a social group, is much more 'squeezed' than in the past. New technologies have therefore not liberated them at all but taken them back to the industrial working model. These, and other problems do not constitute 'an emerging political issue,' nor are they evident in trade union activity. I think, on the contrary, both we and the entire left are not able to recognize how urgent these problems are."[751] The "emerging political issue" referred to Occhetto's speech.

The following day, similar arguments were heard in the closing remarks before the vote on the PCI's future. The final "no" speech was given by Pietro Ingrao, who like Garavini criticized Occhetto for lacking a proper political vision, both in general and in relation to the changes that computers had brought about in the labor market. Ingrao stated that these changes were a fundamental issue and had to be addressed, not only in the job market, thus encouraging a re-politicization of technology. Ingrao mobilized the Principle of Hopeful Curiosity, stressing that the party's main concern should be to foster human agency over technology, by studying the changes brought by technological development and understanding how technology could be used to improve

750 Achille Occhetto, "Un Nuovo Inizio: La Fase Costituente Di Una Nuova Formazione Politica," *l'Unità*, March 8, 1990.

751 "La classe operaia oggi, è si frantumata e articolata, ma costituisce oggi un gruppo sociale ancora più «schiacciato» che nel passato. Le nuove tecnologie perciò non hanno liberato nulla, ma sono state ricondotte al modello del lavoro industriale. Questi -ed altri- problemi non costituiscono una «emergente questione politica». Né, tantomeno, risaltano nell'iniziativa sindacale. Mi pare anzi, che noi stessi e l'intera sinistra stentiamo a riconoscere l'attualità di questi problemi." Sergio Garavini, "Gli Interventi Dalla Tribuna Del Palasport," *l'Unità*, March 9, 1990. 18.

workers' welfare. Ingrao said that contemporary technological change "is something more and something different from man's mechanized adaptation to the Fordist factory, which the unforgettable Charlot in Chaplin's 'Modern Times' showed so well in the 1930s. And it is also different from the standardized way of life that Ford preached and Gramsci notoriously wrote about in jail."[752] According to Ingrao, understanding and guiding this change was precisely the 'new terrain' where the PCI should have focused its political activity: "The question is whether the worker is condemned to be misled, or if he will be able to affirm a new ability in control and self-determination. Therefore, [the question is] if he has a voice in determining this new cycle's outcomes or not, and which collective tools we should think or re-think so that this voice is heard. This is the new terrain."[753]

Ingrao also amplified the Principle of Hopeful Curiosity by highlighting the relevance of the new grassroots left. His other issue with Occhetto's vision was failing to recognize the importance of students' protests also in connection with the aforementioned changes in the job market. Ingrao was referring to the Panther Movement (Movimento della Pantera)[754], the next big grassroots mobilization since the 1977 Movement, though with much smaller numbers. The party's youth section (FGCI) was prominently involved in the movement. The Panther Movement was mostly students protesting the upcoming University Reform. But the movement is also remembered for voicing criticism against commercial media technologies such as television, and for its creative use of communication technologies, notably fax machines.[755]

The students mobilized the Principle of Hopeful Curiosity through their practices, as they learned how to use faxes and computers in order to reclaim their political agency. And Ingrao mobilized trust in them, thus establishing Technopolitical Resonance: "No, the students were not crazy when they pointed out the problem of freedom in television, speaking for millions of users still without power. And also when they, the students, in desperation discovered faxes to communicate in real time with each other. Yes, it is precisely the same problem: the fate of modern knowledge is at

752 "È qualcosa di più e di diverso dell'adattamento macchinale dell'uomo alla fabbrica fordista, che l'indimenticabile Charlot di Tempi moderni all'inizio degli anni Trenta ci rappresentò in quel modo straordinario: ed è anche diverso da quella modulazione del costume di vita, che Ford predicava e su cui Gramsci, dal carcere, scrisse riflessioni indimenticabili." Pietro Ingrao, "Mozione 2: La Conclusione Di Ingrao," *l'Unità*, March 9, 1990. 22

753 "Si apre, a un nuovo livello, la questione se e come il lavoratore è condannato ad essere eterodiretto; oppure se riesce ad alfermare una nuova capacita di controllo e di autodeterminazione. E quindi se ha voce sull'esito di questo nuovo ciclo, oppure no; e quali strumenti collettivi sono da pensare o da ripensare perché questa voce possa esprimersi. Ecco il terreno nuovo." Ingrao. 22.

754 The name and the movement's iconography were both a tribute to the US Black Panthers Party and to an actual panther which in that period was allegedly moving freely around Rome.

755 Alessandra Renzi, *Hacked Transmissions: Technology and Connective Activism in Italy* (University of Minnesota Press, 2020).

stake: from the big computerized enterprise to the schools."[756] At the end of his speech, Ingrao commented on an article in the daily newspaper *Corriere della Sera*.[757] This article's heading was "If the slave is too good" and it discussed the difference between humans and computers' speed, and of course computers were superior. Ingrao provided the reasons for human's lower speed: "It has something to do with affectivity, with emotivity, with 'distraction' as the irruption of fantasy or doubt." This difference was something to nurture, not erase, Ingrao concluded, and "keeping this point of view open, requires new [evaluation] criteria from now on."[758] From the students' protest to the unique characteristics that differentiated humans from computers, Ingrao powerfully mobilized hope in the "non-guaranteed character" of Utopia,[759] encouraging a deeper political and intellectual engagement with new technologies.

Ultimately, however, nothing went as Ingrao hoped. His motion was defeated in favor of Occhetto's, leading to the official PCI dissolution. From its ashes, two political entities arose: the Democratic Party of the Left (Partito Democratico della Sinistra, PDS), which most moderate PCI members joined, and the Communist Refoundation Party (Partito della Rifondazione Comunista, PRC), animated by the radical faction. The Panther Movement students were also defeated, both on the legislative level, as the University Reform was passed with minimal changes, and on the political level, as the movement was then dissolved.

But these political defeats did not mark the Black Box Entanglement's victory. The "desperate discovery" of the fax as a communication tool by the Panther's students was only the tip of the iceberg in a much larger process of technology re-appropriation within grassroots socialist movements, as we shall see in the next chapter. Furthermore, there was one PCI section which, although a latecomer to computer debates, continued powerfully re-politicizing computer debates in the 1980s: its women section.

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756 "lo sono convinto che se sono sconfitti gli studenti, in ultima analisi vincerà anche sua emittenza Berlusconi. No, non sono impazziti gli studenti quando hanno sollevato, essi la questione della libertà del video, parlando anche a nome di milioni di utenti, tuttora senza potere. E quando ancora essi, gli studenti, disperatamente hanno scoperto, i fax, per comunicare, in tempi reali fra di loro. Si: è lo stesso identico problema: è la sorte del sapere moderno, che è in gioco. Dalla grande impresa computerizzata, alla scuola, a quell'ospite onnipresente, che ogni giorno dal televideo ci collega al mondo e al tempo stesso ci manipola: noi, fissi, agganciati, e in tanti, in troppi, senza voce." Pietro Ingrao, "Mozione 2: La Conclusione Di Ingrao," 22.

757 Gianfranco Dioguardi, "Quando Lo Schiavo è Troppo Bravo," *Il Corriere Della Sera*, February 5, 1990.

758 "Tenere aperto questo punto di vista chiama ad altri criteri, da ora." Pietro Ingrao, "Mozione 2: La Conclusione Di Ingrao," 22

759 Ernst Bloch, *The Principle of Hope* (MIT Press, 1986).

4.3 The patriarchy's computer. Socialist women and The Black Box Entanglement

Women's role in PCI's history and, vice versa, the PCI's role in women's history, was ambivalent. On the one hand, the PCI prided itself on having the highest number of women in the Constitutional Assembly, and also the Chamber of Deputies' first woman president, Nilde Iotti. The party was also more socially progressive, embracing (although not always eagerly) women's struggles such as divorce and abortion laws. At the same time, the PCI was also informed by the era's culturally and socially conservative environment, reflected in a very male-centered political culture.[760] For example, PCI women recalled how several male party members viewed the struggle to legalize divorce as a lost cause, and showed no support or enthusiasm for the proposal.[761] And, although the PCI had more women in relevant political roles than other parties, most key leadership positions were firmly held by men. When the women's sections brought up new themes for discussion, the rest of the party was often slow to respond—if at all.

From the early 1980s, Italian Communist Party women became increasingly interested in computers. This interest grew within a wider network of women organizations, feminist groups, and independent women researchers and intellectuals. A crucially debated theme was whether computers could indeed be a tool for women's empowerment, or if they would just bring "more work for mother,"[762] but also "worst work," or even "no work"—and not only for mothers, but women in general.[763] The interest in this topic stemmed from women and feminist organizations' analysis on the political significance of "work" and "housework," also to address the lack of interest their male comrades showed in these themes. Furthermore, these men were not only uninterested in discussing "housework" as "work," but also enacted conservative gender roles in their own households.[764] A 1975 song from the "Canzoniere Femminista" (Feminist Songbook) effectively summed up the issue: "dear comrades, you say that// you are not interested in women in general//

760 Stephen Gundle, "From Mussolini to Berlusconi: Masculinity and Political Leadership in Post-War Italy," in *The Palgrave Handbook of Masculinity and Political Culture in Europe* (Springer, 2018), 435–55.

761 The most symbolic example is PCI secretary Palmiro Togliatti, who left his wife after WWII for Nilde Iotti. He did not support divorce laws, despite earlier attempting to move to San Marino, where divorce was legal, and where another party secretary, Luigi Longo, had successfully divorced his wife. Luisa Lama, *Nilde Iotti: Una Storia Politica al Femminile* (Donzelli, 2013); Gundle, "From Mussolini to Berlusconi."

762 Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (Basic Books, 1983).

763 On the historical foundations of women's exclusion from technology, see: Ruth Oldenziel. *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945*. Amsterdam University Press, 1999.

764 Maud Anne Bracke, "Building a 'Counter-Community of Emotions': Feminist Encounters and Socio-Cultural Difference in 1970s Turin," *Modern Italy* 17, no. 2 (2012): 223–36.

but only in proletarian women// well, while you were busy with class struggle// your proletarian [female] comrades// kept working for free."[765]

As we shall see in this final section, socialist women's computer debates originated from a very radical critique of the Black Box Entanglement's micro-politics and macro-politics. Women established Technopolitical Resonance with their male comrades through the Principle of Hopeful Curiosity. In fact, they also shared the same criticism of the Black Box Entanglement's promises. But women enriched this criticism with a gendered perspective, mobilizing a new emotion: Creative Anger, which is, anger leading to the imagining or creation of new ideas, practices, or artifacts that can address the source of anger. Women's anger was not just directed at the Black Box Entanglement's promises, but also at their male comrades, who once again failed to include women's issues in their computer debates. This was a very powerful emotion, because women struggled to be recognized as political actors in many socialist organizations, and indeed throughout the entire history of Italian socialism, from the partisan fighters[766] to the Workerist group Continuous Struggle.[767] This anger was "creative" because it led women to increase their efforts promoting Scientific Curiosity about gender and technology, and ultimately resulted in crafting a new policymaking proposal.

4.3.1 No work for women? Gendering the Black Box Entanglement

Women's relationship with technology was first addressed in early-1970s PCI debates. At the 13th congress (1972), Francesca Marazzi, a factory worker at Olivetti and PCI Central Committee member, stressed the importance of paying attention to women when analyzing and planning changes in the job market related to technological development.[768] It was especially important that the party addressed key themes affecting a wide category of workers, namely women: improve housing laws, foster the practice of home offices, support women's right to work. However, these themes were not further addressed at the national level, neither by the male majority nor by the

765 "Cari compagni voi che dite // che non vi interessano le donne in generale // ma solo le donne proletarie // mentre voi facevate la lotta di classe // le vostre compagne proletarie continuavano // a lavorare gratis," Il canzoniere femminista, " Stornello per i compagni", *Canti di donne in lotta*, Vedette, Zodiaco, 1975.

766 Michela Ponzani, *Guerra Alle Donne: Partigiane, Vittime Di Stupro," Amanti Del Nemico," 1940-45* (Einaudi, 2012).

767 Patrick Cuninghame, "Italian Feminism, Workerism and Autonomy in the 1970s. The Struggle against Unpaid Reproductive Labour and Violence," *Amnis. Revue d'études Des Sociétés et Cultures Contemporaines Europe/Amérique*, no. 8 (2008); Stefania Voli, "Quando Il Privato Divenne Pubblico. Lotta Continua 1968-1976," in *Donne: Lavoro e Politica* (Promemoria/ISEC, Istituto per la storia dell'età contemporanea, 2006).

768 Francesca Marazzi, in "II Dibattito Sui Problemi Del Paese al XIII Congresso PCI," *l'Unità*, March 16, 1972. 8.

women in the party. Generally speaking, PCI women did not engage much with technology debates in the 1970s.

Things changed in the 1980s. Computers started to generate growing interest within women's movements. A symbolic event was the "National Communist Women's Festival" which took place in Bologna in 1982. This festival, which went on for an entire week, included a program dedicated to women and computers. The conference hosted an exhibition on computers and a whole day of seminars on the theme "New technologies and/or the female question," discussed by a group of Italian and international experts. A major theme debated was the new technology's impact on women's work. According to the press coverage, the conference was very successful and well attended. Even the Catholic church magazine *Avvenire* recognized the initiative's success. It had also organized a mass media event on the same day, which apparently did not go as well. "While leaving [our conference venue]" read the article, "we faced a huge mass of people: they were going to or coming from the national women's festival organized by the PCI at the Montagnola [public park]. They also spoke about mass media, with the difference that there were no empty seats."[769]

In a report for the communist newspaper *il manifesto*, journalist Ritsana Armeni observed that the conference speakers were divided into two groups, on the one hand, "the party of the concerned and pessimists," and on the other hand, "the party of the hopeful and optimists."[770] The first group was largely the international guests, British scholars and activists famous for their studies on the connection between gender, technology, and work. They were Cynthia Cockburn from London City University, Christine Shannon and Felicity Henwood from Sussex University, and worker unionist Ursula Huws. They presented their studies on the (largely negative) impact that new technologies were having on women in the United Kingdom. The second perspective was presented by Italian speakers, who had a more diverse background: the well-known Paola Manacorda, FLM worker unionist Adele Pesce, Raffaella Baraldi from a public research institute for education, social policy, and work (ISFOL), PCI European Parliament deputy Vera Squarcialupi, and Laura Pennacchi from the research center on economic policy CESPE.

769 "Nell'uscire dal teatro dei Salesiani ci siamo imbattuti prima in una marea di gente: tornava dalla festa o andava alla festa nazionale delle donne indetta dal PCI alla Montagnola. Anche lá si è parlato di mass media, con la differenza che non c'erano poltrone vuote." "Le Donne Del PCI Il Mago e i Mass Media," *L'Avvenire*, April 25, 1982. In: Festa Nazionale della Donna, Rassegna Stampa, Archivio Istituto Gramsci Emilia-Romagna.

770 Ritsana Armeni, "Signori Del Computer e Lavoro Nero Informatico. Un Dibattito," *il manifesto*, February 25, 1982. In: Festa Nazionale della Donna, Rassegna Stampa, Archivio Istituto Gramsci Emilia-Romagna.

More than dividing them into "concerned and pessimist" or "hopeful and optimist," I would say the first group predominantly mobilized Creative Anger, while the second group predominantly mobilized the Principle of Hopeful Curiosity. However, all these women established Technopolitical Resonance with each other, on the basis of both Creative Anger and Hopeful Curiosity. The conference's aim was to "acquire cultural and techno-scientific tools to not be subjected to technological innovations, but to be aware of their limitations and the advantages they can bring."[771] This aim points at the Principle of Hopeful Curiosity, as it mobilized Scientific Curiosity (to acquire the tools) and the Principle of Hope (reclaiming agency over technology). The statement also contains a regulating emotional based on the Principle of Hopeful Curiosity (being conscious of both limitations and advantages, which is to say, "no excessive fear, no excessive enthusiasm"). And all these women, because of their involvement in women's movements and debates, were also united by the awareness that the "Technological revolution has a tendency to erase diversity right in the moment when lived experiences are acquiring a new priority, and there are a lot of expectations and possibilities," as Adele Pesce recalled.[772] After women were told their subjectivities would count more in society, these subjectivities now counted for nothing in the "computer revolution," presented as bringing the same benefit to everyone, and in the same way. This caused disappointment, and anger. And particularly Creative Anger, as these women were discussing the problem at that very moment, analyzing its evolution and envisioning possible solutions.

The British scholars' Creative Anger focused on the theme of work, and in particular how computers had changed it. These scholars challenged both the Black Box Entanglement's micro and macro-politics, especially the assumption that computers could benefit the workplace and increase the workforce's technological know-how. Creative Anger was mobilized as the speakers showed that the computer sector was currently no place for women. The anger came from the fact that this machine, often depicted as a revolutionary tool, was indeed not changing a lot for women's work. In fact, the computer sector was often excluding women. The creativity came from the efforts that women were making to overcome their lack of representation and power in the computer sector.

The data the British scholars collected highlighted that women were a particularly vulnerable category when new technologies were involved: not only did they have very few computer skills to begin with, they were also competing in a very male-dominated environment which made it

771 Sezione Femminile PCI Bologna, "Perché Un Convegno Su 'Nuove Tecnologie e/o Questione Femminile'?," 1982, Festa Nazionale della Donna 1982, Corrispondenza, Archivio Istituto Gramsci Emilia-Romagna.

772 "La rivoluzione tecnologica tende ad annullare la diversità proprio nel momento in cui il vissuto acquista priorità e c'è un'eccedenza di aspettative e di possibilità." Adele Pesce, in Armeni, "Signori Del Computer e Lavoro Nero Informatico. Un Dibattito."

difficult to improve their skills. Cynthia Cockburn discussed that the current situation was a result of two parallel and overlapping processes of appropriation. In the same way capitalism used machines to keep the workforce in a state of subjugation, men did the same with women. It was no coincidence that so few women chose technical jobs: technical expertise had systematically and continuously precluded women. Cockburn observed that many machines were too big or too heavy to be operated by women: but this was a design choice, which could have been different. In an interview with the PCI conference organizer, Cockburn pointed out, "what is progress, is decided according to patriarchal, aggressive, and competitive parameters."[773] Her analysis showed that computer technologies should no longer be seen as the "Capital's computer," but the "patriarchy's computer."

The seminar pointed out how the macro and micro-politics of the Black Box Entanglement were particularly intertwined when it came to gender. Women lacked technical knowledge and were discouraged from gaining it, by the same discourses which promised computers would improve their lives. In other words, women recognized and denounced a gendered regulating emotional practice, which categorized their interest and their enthusiasm about computers as undesirable, yet the same feelings were positively welcomed when expressed by men. The "black box" in the Black Box Entanglement was not only a matter of closed design, but also a closed profession.[774] Indeed, the computer revolution seemed to be picturing a future society with "no work for women." But the seminar also suggested how to counter the Black Box Entanglement: by amplifying the Principle of Hopeful Curiosity's Technopolitical Resonance and giving it a gendered twist through Creative Anger. Computers never became a key theme of interest for socialist women, however the relationship between women and technology remained a topic for discussion in the following years, fostering a re-politicization of computer debates.

4.3.2 Worst work for women? Computers between "production" and "reproduction"

In the following year, 1983, the relationship between gender, technology, and work was further analyzed during the international conference "Produrre e Riprodurre" (to Produce and to

773 "Che cosa sia il progresso […] viene deciso secondo parametri patriarcali, aggressivi e competitivi", Cynthia Cockburn, interview for the PCI conference magazine "Quotidiana", Sezione Femminile PCI Bologna, "Quotidiana," May 25, 1982, Festa Nazionale della Donna 1982, Archivio Istituto Gramsci Emilia-Romagna.

774 Thomas J. Misa, ed., *Gender Codes: Why Women Are Leaving Computing* (John Wiley & Sons, 2011); Janet Abbate, *Recoding Gender: Women's Changing Participation in Computing* (MIT Press, 2012); Mar Hicks, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (MIT Press, 2017).

Reproduce).[775] The conference theme was "Changes in the relationship between women and work," and 600 women from 16 different countries attended. Many belonged to feminist groups and collectives or women's organizations, others were engaged with women's issues through their work as labor unionists, researchers, or policy experts. The conference was organized by Italian Women's Union (Unione Donne Italiane, UDI),[776] Turin Women's House (Casa delle Donne di Torino), women's sections from workers unions CGIL, CISL UIL and various feminist collectives. The PCI was not directly involved in the organization, but its women's magazine *Donne e Politica* took part in the conference, as did women party members.[777] The conference was also covered in *l'Unitá*,[778] and an exhibition was held about it during the 1984 national Unity Festival (Festa dell'Unità), the official PCI festival) in Rome.[779]

One of the seminar themes was "new technologies." About 80 women attended, from Italy, Belgium, France, Spain, the UK, Switzerland, the Netherlands, and Germany.[780] The topic was unexpectedly popular, surprising the conference organizers: "We expected only a few people, just those already closely involved in this topic. Instead, the group before us was considerably large, diverse, and interested."[781] This seminar is interesting to see how the Black Box Entanglement's Technopolitical Resonance was countered, as most women focused their talks on what was wrong about contemporary computer discourses and design, thereby mobilizing skepticism in the Black Box Entanglement's promises, rather than pointing at "alternative" uses.

As some conference participants worked in the computer sector, they provided an internal perspective. They identified and criticized the Black Box Entanglement, showing that macro-political promises were intertwined with the micro-politics of work in the computer sector. Agnese Piccirillo, a researcher in Turin's computer sector, stressed the influence of Fear of Falling Behind in the computer sector, observing that "there is an atmosphere of inevitability in technology development, tied to discourses exclusively about economic aspects and maintaining a high productivity to compete on the global level. Furthermore, this process is seen as an external force,

775 The conference proceedings were published the following year. See: Movimento delle donne di Torino, ed., *Produrre e Riprodurre: Cambiamenti Nel Rapporto Tra Donne e Lavoro* (Cooperativa editrice il manifesto, 1984).
776 This organization was established after WWII to promote women in politics, society, and culture. It was not political, as women from every party joined it.
777 The Gramsci Archive Emilia-Romagna has files on this congress, suggesting that PCI women attended.
778 See: Bianca Mazzoni, "La Donna Nell'Europa Degli Anni '80," *l'Unità*, April 24, 1983; Bianca Mazzoni, "Contro La Crisi, Ma Con Ottimismo Le Donne Chiedono l'orario Ridotto," *l'Unità*, April 26, 1983.
779 Luciano Fontana, "Il Labirinto e I'albero Dei Desideri: Viaggio Nelle Battaglie Delle Donne," *l'Unità*, August 12, 1984. 16.
780 Movimento delle donne di Torino, *Produrre e Riprodurre*. 118.
781 "Ci si aspettava, infatti, di essere in poche, le intime, le adddette, invece, ci trovammo di fronte a un gruppo le cui caratteristiche salienti erano la numerositá, l'eterogeneitá e l'interessse." Produrre e Riprodurre. 95.

above the researchers. For them, it is as if technology self-generates. It is a game, impossible to stop, always seeking new applications."[782] The "them" Piccirillo referred to were her male colleagues. At another conference session, she mobilized concerns about the risk of "becoming like many of my obsessed colleagues, whose biggest problem is that the CPU should be 8 nanoseconds instead of 10, and if they are able to make a software program in 8 nanoseconds, then they find libido, it is the biggest orgasm."[783] With these words, Piccirillo mobilized again skepticism over the fear of falling behind that motivated her male colleagues' work.

Other participants provided insights on computer's material production and how it affected women. Barbara Pettine, a labor unionist working at SGS Microelectronics,[784] observed that "multinational companies producing electronics have a productive organization based on the fact that all the assemblages […] are done in South-East Asia, where they can use mostly a female workforce: girls who are 10 to 18 years old, for 10/12 hours per day, with very low costs."[785] This example pointed at a new type of "imperialism" tied to computer companies. In the 1970s, labor unionists and other members of the left highlighted computer multinationals' involvement in US wars. Now these wars were over, the computer industry exploited the Global South population in new ways. This clearly contradicted the Black Box Entanglement's promises, as Pettine stressed how these young women (who made the computer age materially possible) were subjected to terrible working conditions. In other words, they were not enjoying the computer revolution's benefits, but exemplified the very asymmetrical nature of this revolution: the people who *made* computers experienced them very differently from those who *used* them.

A crucial discussion theme was the difference existing between the epistemological and cognitive models for men and women. This profoundly challenged the micro-politics of the Black Box Entanglement. Women pointed out that this epistemic diversity was not taken into account in the computer field, negatively impacting women's encounters with the technology. Researcher

782 "C'è un'atmosfera di inevitabilitá rispetto allo sviluppo della tecnologia che sembra sia dovuto a discorsi esclusivamente economici e di produttivitá elevata per essere competitiva a livello mondiale. Inoltre questo processo è visto come una forza esterna, che sta al di sopra anche dei ricercatori, per quanto li riguarda è come se la tecnologia generasse se stessa. È un gioco, un'impossibilitá a fermarsi nel cercare sempre nuove possibilitá di applicazione." Produrre e Riprodurre. 114.

783 "Diventare come tanti miei colleghi patiti, per cui il problema piú grosso è che la CPU invece di essere 10 nanosecondi sia 8 e se riescono a fare un programma in otto nanosecondi c'è la libidine, l'orgasmo piú grande." Produrre e Riprodurre. 116.

784 SGS was a semiconductor manufacturer born out of a merger between former Olivetti company "Societá Generale Semiconduttori" and another Italian manufacturer.

785 "le multinazionali che producono elettronica hanno un'organizzazione produttiva basata sul fatto che tutti i montaggi […] sono fatti in sud-est asiatico, dove è possibile utilizzare manodopera prevalentemente femminile, ragazze dai dieci ai diciotto anni, per dieci/dodici ore al giorno con dei costi bassissimi." Produrre e riprodurre. 114-115.

Christine Zmroczek observed that computer science courses were often tailored to men's learning style,[786] pushing women to become more like men, "which is being able to use these machines without asking about their actual qualities, or problematizing how they are built or how you work with them."[787] A participant from Bologna[788] stressed that computers worked through a binary logic, which did not account for conflict and therefore could not be used as a "creative" tool: computers could only reproduce society as it already was.[789] Paola Manacorda broadened this argument by focusing on modeling. She underlined modeling had to be compatible with the notion of "subjectivity," meaning that abstract models should always be open to interpretation and applied differently according to user needs.[790] Therefore, Manacorda observed, "in the new technologies, the biggest bet that we, as women, can take is precisely the ability to design models that interpret reality, as these are the ones that are transformed into software and embedded in machines to create new goods and new services."[791] Physicist Elisabetta Donini made the same point, specifying that new technologies did not create "new" epistemological models, but exasperated the existing capitalist production relationships.[792]

Women also reported that whenever they publicly mobilized their Scientific Curiosity towards computers, they were discouraged. This exemplifies the Black Box Entanglement's gendered aspect, which is, how computers were kept as "black boxes" specifically regarding women. Librarian Valentina Comba explained that her interest in computers was explicitly discouraged by her coworkers: "when I started to be interested in the subject, I was told that it was better if I thought about my work, and leave computers to the computer experts."[793] Her female colleagues experienced similar reactions: whenever they wanted to learn more about how to apply computers in their work they were referred to the calculus centers, and therefore "their need to understand what is happening, even just at the general level, is frustrated."[794] Consequently, according to

786 On men and women's different learning styles and implications for computer education, see: Sherry Turkle and Seymour Papert, "Epistemological Pluralism: Styles and Voices within the Computer Culture," *Signs: Journal of Women in Culture and Society* 16, no. 1 (1990): 128–57.

787 "Cioé renderle in grado di utilizzare queste macchine senza domandarsi quale sia la loro vera natura o porsi problemi su come sono costruite o sul modo in cui ci si lavora." Produrre e Riprodurre. 100.

788 The proceedings only quote her as "Benedetta" and was a professional trainer.

789 Produrre e Riprodurre. 104-105.

790 Produrre e Riprodurre. 105-107.

791 "Nelle nuove tecnologie la scommessa grossa che noi, come donne, potremmo assumerci è proprio questa: la capacitá di progettare modelli interpretativi della realtá che sono poi quelli che trasformati in software e incorporati nelle macchine danno luogo ai nuovi beni e servizi." Produrre e Riprodurre. 107.

792 Produrre e Riprodurre. 108.

793 "quando ho cominciato a interesarmi di questo argomento mi è stato detto che era meglio che io facessi bene il mio lavoro e che lasciassi fare agli informatici gli informatici". Produrre e Riprodurre. 109.

794 "la loro esigenza di capire cosa sta succedendo, anche a livello generale, viene frustrata." Produrre e Riprodurre. 109.

Comba, many female employees ended up developing a passive attitude towards technology, just accepting whatever new form of automation was introduced in their workplace without asking questions.

The concluding remarks drafted by the "new technologies" working group showed a mixture of concern and interest toward computers. On the one hand, many participants had evidenced the Black Box Entanglement's implications for women, which were alarming. Women perceived themselves as particularly vulnerable to the Entanglement's negative consequences as their role was absolutely marginal in the computer sector: they neither had adequate knowledge of the technology, nor held adequate positions to control its development. And, if they had jobs in the computer sector, these were often at a low level, or anyway not adequately fulfilling women's scientific curiosity. In other words, computers were providing the "worst work for women." But women's concerns about their subaltern position in the computer age could be solved, by mobilizing Scientific Curiosity. Many women expressed the need to overcome this marginal position by increasing their efforts to understand and appropriate new technologies.

The effort to increase women's engagement with computers materialized in the following years, with books and reports further developing the topics discussed in early 1980s women's computer debates. Women researchers and computer experts mobilized Scientific Curiosity to overcome the Black Box Entanglement's micro-politics, by investigating women's presence in the Italian computer sector and promoting strategies to increase their numbers and influence. An official government report on *Donna e Tecnologie* (woman and technologies) was published in 1986.[795] The report was commissioned by the "new technologies" working group of the National Committee for Gender Equality, under the first Craxi government (PSI, Italian Socialist Party), and authored by Paola Manacorda and scholars Nando Dalla Chiesa and Renata Livraghi. The report showed that the analysis the British scholars had presented in recent years was also largely true for the Italian context. Women's educational levels were rising in Italy, but not significantly in computer related degrees. Most women preferred "information sciences" (focusing on software) rather than engineering (focusing on hardware) degrees. Women still risked experiencing more harm than good from technological development. Following the debates in the first half of the 1980s, the authors suggested that the best solution to fill the computer gender gap was to focus on affirmative actions.

795 Paola Manacorda, Renata Livraghi, and Nando Dalla Chiesa. "Donna e Tecnologie." Commissione Nazionale per la Realizzazione della Parità tra uomo e donna, 1986.

Yet, the Italian government was still uninterested in computers, and investments in the sector were limited—for both men and women.

4.3.3 More work for women? Computers from "housework" to "home office"

In 1985, Paola Manacorda and Paola Piva[796] collected the main debates on women, work and computers in the volume *Terminale donna. Il movimento delle donne di fronte al lavoro informatizzato* (The female terminal. The women's movement facing computerized work).[797] Some of the British scholars at the 1982 and 1983 conferences also contributed to the book.[798]

One book section "Domestic work, working for the market" dealt with the relationship between housework, work, and new technologies. In popular computer narratives, changes in the job market were often presented as a good opportunity for women, who could work from home thanks to computers. But this claim was controversial in women's debates, and showed all the fragility of the Black Box Entanglement's promises: beyond the words, their outcome kept being different for men and women. Furthermore, these examples also mobilized Creative Anger. The relationship between "work" and "housework" was a key theme in women's debates and in the feminist movement, also implied by the conference title "Produrre e Riprodurre": it stressed the existence of "productive" labor as in the factory, and "reproductive labor" in the household. This theme united women from different backgrounds, and regardless of their political engagement, created a powerful emotional bond (not yet Technopolitical, only Resonance).[799] Any debate on the matter started out with its own consistent emotional baggage. Technology seemed to be largely bringing "more (unpaid) work for women," not less. This was not just a cause for concern, but also anger: women's reproductive labor was again invisibilized. As the 1970s feminists sang: "State! Masters! Empty your pockets // because women want money; // for years, for centuries, we worked // for years, for centuries, you exploited us. // Our work, denied by everyone // shall be now paid as work!"[800]

The fact that computers could mean "more work for women" was an issue Paola Manacorda and Adele Pesce had already brought up at the 1982 PCI women's conference. Manacorda pointed out

796 An independent researcher and worker unionist.
797 Paola Manacorda and Paola Piva, eds., *Terminale Donna*.
798 For example, Cynthia Cockburn, Christine Zmroczek, and Ursula Huws.
799 Maud Anne Bracke, "Building a 'Counter-Community of Emotions': Feminist Encounters and Socio-Cultural Difference in 1970s Turin," *Modern Italy* 17, no. 2 (2012): 223–36.
800 "Stato, padroni, fatevi i conti // perchè le donne vogliono i soldi; // per anni, per secoli abbiamo lavorato,// per anni, per secoli ci avete sfruttato.// Il nostro lavoro da tutti negato // come lavoro deve essere pagato!" Il Canzoniere Femminista, "Stato, Padroni".

how working from home would not necessarily be an advantage for women, who risked having even more care duties than before.[801] The "Produrre e Riprodurre" working group on new technologies also highlighted this concern in their conclusions: "the future society […] is called the service society. At first, it seems an improvement in our living conditions. But the actual state of things is not encouraging: these are not services which will remove workloads like housework management and/or childcare… future society looks like the self-service society, in which maybe we'll buy groceries from a terminal, but all the burden [of housework] will be, as usual, on our shoulders."[802] The "as usual" is important here, because it shows these women wanted to explicitly remark that nothing was changing regarding the gendered distribution of housework. And, as we know, women had put much effort into bringing this issue to the political arena.

Terminale Donna discussed the relationship between technology, work, and housework in four essays. The first, by Christine Zmroczek and Thomas Graham, "Domestic technologies: freedom for the housewife?" focused on whether technological development was positive or negative for women's emancipation.[803] The authors described how technology reduced housework. For example, the aqueduct saved people's time, not having to get water every day from a well. But they also pointed out how technology actually increased the housework burden. The greater proportion of private cars had reduced public transport and parents were now expected to drive their children to school every day, adding more time to their childcare duties. Certainly, some housework was easier thanks to modern technologies, as children could drop their laundry in the washing machine. However, the greater availability of devices also generated higher expectations for housework quality, for example clothes were expected to always be perfectly clean and smell nice. Mothers ended up spending much time doing laundry.[804] One crucial aspect emerged from this evidence: "The computer revolution might disseminate around the house a greater number of microprocessors and sensors. But, until we have extraordinarily intelligent robots, most housework (especially cleaning and tidying up) will stay the same,"[805] observed the authors.

801 As reported in Armeni, "Signori Del Computer e Lavoro Nero Informatico. Un Dibattito."

802 "La societá del futuro […] è chiamata la societá dei servizi. Sembrerebbe una bella prospettiva di miglioramento della nostra vita, ma gli attuali presupposti non sono incoraggianti: non sono servizi che solleveranno da una serie di carichi di lavoro come la gestione del lavoro domestico e/o la cura dei figli… La societá del futuro si presenta come la societá del self-service, dove forse ordineremo la spesa attraverso un terminale, ma il peso di tutto sará sempre sulle nostre spalle." Produrre e Riprodurre. 119.

803 Christine Zmroczek and Thomas Graham, "Tecnologia Domestica: Liberazione Della Casalinga?," in *Terminale Donna* (Edizioni Lavoro, 1985).

804 Zmroczek and Graham. 82.

805 "La 'rivoluzione informatica' potrá spargere per casa un maggior numero di microprocessori e sensori, ma almeo fino all'avvento di robot straordinariamente 'intelligenti', il grosso delle incombenze domestiche di tipo manuale (soprattutto pulire e riordinare) rimarrá pressapoco invariato". Produrre e Riprodurre. 93.

They envisaged two possible paths for domestic work's future.[806] These mirrored the expectations of the Black Box Entanglement and its critique. The first path implied going along with the Black Box Entanglement promises, waiting for the day when technology could free humanity not just from "work" but also from "housework." The second path prioritized the active search for new forms of family organization, envisioning technology as a tool rather than a solution. The first path would keep on privatizing domestic work, and keep having women do it. This could be coupled with an increase in women doing their paid job from home. Such a situation might further reduce social services, therefore discourage the search for alternative forms of family organization. The second path, which the authors preferred, implied recognizing "domestic work" as "work." This meant time-organization based on sharing housework between men and women, as well as diverse families experiencing new living experiments.

After these reflections on domestic and paid work, Pinuccia Cazzaniga wrote about "Work shifts in an electronics company."[807] Cazzaniga worked at the SGS production plant in Agrate Brianza (Milan). At the "Produrre e Riprodurre conference," Barbara Pettine had pointed out the working conditions for SGS female workers in South-East Asia. Cazzaniga showed that Italy had its problems too. Her essay highlighted that, in computer production timings, the decision to go for continuous production cycles was not about technological requirements, but economic ones. Cazzaniga pointed at the Fear of Falling Behind as a decisive factor. She stressed that the computer sector was marked by a constant need to keep up with the rapid technological developments in microelectronics: "each year the microprocessor becomes more sophisticated and is produced at a lower cost. For this reason, also the technologies producing the microprocessors are very sophisticated and frequently renewed, with a 4/5 year planned obsolescence. The very high amortization cost today, and in the future, is the main push for using the plant at full power."[808] This created problems for SGS female workers, especially when the factory's opening time became 24/7 and they had to organize their shifts around a different time-table. The problems came about due to Italian men and women having different approaches and perspectives on the notion of "time."

806 On the relationship between technological development and domestic work, see: Ruth Oldenziel and Karin Zachmann, eds., *Cold War Kitchen: Americanization, Technology, and European Users* (MIT Press, 2009).

807 Pinuccia Cazzaniga, "I Turni Di Lavoro in Un'azienda Elettronica," in *Terminale Donna* (Edizioni Lavoro, 1985).

808 "Ogni anno il microprocessore diventa sempre piú sofisticato e prodotto a costi sempre piú bassi. Per queste caratteristiche del prodotto anche le tecnologie che producono il microprocessore sono molto sofisticate e si rinnovao velocemente con un ritmo di obslescenza degli impianti che si aggira intorno ai quattro, cinque anni. Il coto altissimo dell'ammortamento è e sará anche in futuro la spinta prevalente all'utilizzo degli impianti a pieno regime." Cazzaniga. 104.

This example shows that the Black Box Entanglement's promises had very negative consequences for women working in the computer sector. The Fear of Falling Behind that the Black Box Entanglement relied on was significantly ambiguous. The productive effort required to "not fall behind" the promised computer society, implied a deterioration of working conditions for the women materially producing that computer society. The SGS workers put forward two issues. The first was housework and care related activities, which took up women's time. The new production timings were not easily compatible with women employees' double role as workers and housewives. The second issue was an even more pressing concern: the new timings extended production to a time of day perceived by women as unsafe, thus generating very concrete fears. Night shifts implied having to walk alone at night, to or from the bus stop to get to work, and women feared for their personal safety. Cazzaniga explained that, following many meetings between the company and workers unions, women accepted working on weekends but still strongly opposed night shifts.

The volume's final essays focused on women working from home thanks to computers. They explained that the different time organization for men and women was also a key issue in home-based work. One essay, "Distance working," authored by researchers Eva Gunnarsson and Gitte Vedel, used examples from Denmark and France.[809] The authors observed how in most cases, women working from home were doing low-level and low-paid jobs, which were exclusively performed from home. Conversely, men usually combined working from home with working in the office. Working from home implied a different setting for men and women: men had a choice, whereas this was not possible for women. Ursula Huws's article "Modern women working from home," presented a case study on British computer system administrators and programmers.[810] Even though these women were in a better professional category than the ones in the previous article, they were paid less than the programmers working in offices. For many, working from home was a forced choice, due to poor social services or public transport. Some women reported feeling depressed and undervalued. Overall, there was only one category of women for whom working from home was a good thing: those who actually chose to do it. Gunnarsson and Vedel gave the example of a woman who did not like the office environment, so she built a home office in a separate part of her house, and worked while her children were in school. This was a successful example of how a woman could work from home and actually improve her situation. However, this was not the case for most women home workers, according to the researchers.

809 Eva Gunnarsson and Gitte Videl, "Il Lavoro a Distanza," in *Terminale Donna* (Edizioni Lavoro, 1985).
810 Ursula Huws, "Le Moderne Lavoratrici a Domicilio," in *Terminale Donna* (Edizioni Lavoro, 1985).

Although the option to work from home was presented as a very desirable feature of computers, for many women it did not mean more freedom but more isolation and pushing back into a traditional gender role. Women working from home faced very pressing problems: conservative expectations of childcare and housework duties; the impossibility to bond with other colleagues and thus discuss how to improve their working conditions; difficulties in advancing their careers. Ultimately, the growing opportunities offered by computers did not solve the gendered nature of "Production" and "Reproduction" times.

The case studies on housework, home working, and new technologies published in *Terminale Donna*, thus further challenged the Black Box Entanglement's promises. They demonstrated yet another way that women were excluded by the (alleged) advantages that computers brought. As mentioned, discourses on these themes had a very important emotional charge. They also mobilized Creative Anger. The "creative" side of this anger, as we will see, would materialize through PCI women's new ambitious policymaking.

4.3.4 Better work for everyone? A different speed for the computer age

After almost a decade of debates, one thing was clear to socialist women: to overcome the barriers formed by the current patriarchal-capitalist model of technological development, it was necessary to increase women's technological know-how, as well as challenge the production model and culture that inspired it. This second aspect was particularly crucial. In the 1982 PCI women conference, Raffaella Baraldi criticized an essay written by US feminists, titled "run against time." According to Baraldi, women should rather "run alongside time"—not by focusing on new technologies' given consequences, but by demanding these technologies adapt to women's needs.[811] By refusing to "run against time," Baraldi countered the macro-politics of the Black Box Entanglement, and the other computer discourses mobilizing the Fear of Falling Behind. Baraldi called for a radical reconfiguration of how technology was imagined and built. This reconfiguration had to bring back human needs (particularly women's) to the center.

In the second half of the 1980s, discussions on the notion of "time" became particularly central in PCI women's groups. These debates focused on the different needs women and man have in their time organization, particularly due to different care duties. In 1989, the PCI women presented a

811 As reported in Armeni, "Signori Del Computer e Lavoro Nero Informatico. Un Dibattito."

"popular initiative law"[812] called "Women change times" (Le donne cambiano i tempi). This proposal powerfully mobilized Creative Anger, stemming from the decade-long debates on "reproductive labor" and "productive labor." Chamber of Deputies president Nilde Iotti openly supported the law, even though this was unusual practice in her institutional role. On April 9 1990, on the eve of her 70th birthday, Iotti inaugurated the initiative from the Pantheon in Rome.[813] The proposal was well received: 300,000 signatures, and in October 1990 it was taken to parliament.

Notwithstanding this success, PCI women lamented that the male party members did not show much support for the proposal, confirming once again the party's very conservative culture (and likely making women angrier). Iotti observed that the PCI men reacted in a very similar way towards the late 1960s divorce laws.[814] Livia Turco, a main proponent of the law, recalled that when women started debating the "time" issue, male comrades thought they were crazy to be discussing such an abstract concept.[815] The proposal, however, was based on very concrete experiences and needs. "Women Change Times" was inspired by an actual experiment with time-planning, carried out in 1987 by the mayor of Modena, Alfonsina Rinaldi.[816] The PCI women presented ambitious yet very specific requests, like reduced working hours, better parental leave agreements, different urban time organization, and promoting life-long learning initiatives.

Although women's computer debates did not increase the number of women with engineering degrees, they played a role in fostering PCI women's Creative Anger, indirectly contributing to "Women change times." The link between the law and women's computer debates was not obvious in the promotional material. For example, in 1990, the PCI women printed a booklet to promote the law, but made no specific mention of new technologies' role.[817] However, women's earlier debates on computers certainly helped to develop an interest in the notion of time. Some of the women who discussed "women change times" had also participated in the early-1980s women's computer conferences and books. Notably, Paola Manacorda was a key figure in both settings. She had been a pioneer in analyzing the political and gender implications of computing, with a particularly keen eye on how these were related to the organization of work and time, and as an expert, took part in

812 Citizens can directly propose this law. A certain number of signatures means parliament is formally obliged to debate (but not necessarily approve) the proposal.
813 "Le Parole Della Mia Vita: Nilde Iotti Oggi Compie 70 Anni," *l'Unità*, April 10, 1990. 6.
814 "La Legge Sui Tempi Varca Il Portone Di Montecitorio," *l'Unità*, October 10, 1990. 4.
815 Livia Turco, Festa de l'Unitá 2019 Rome, August 3rd https://www.radioradicale.it/scheda/580288/festa-de-lunita-2019-presentazione-del-libro-le-leggi-delle-donne-che-hanno-cambiato, accessed September 20, 2022.
816 She introduced flexible working hours in the city public administration, and extended commercial activities' opening hours, allowing shops to stay open until 21:00 in winter and midnight in summer.
817 Sezione femminile nazionale del PCI, "Le Donne Cambiano i Tempi," 1990.

the “Women change times” debates.[818] Others engaging in both early and late 1980s debates on women and time were Adele Pesce and Laura Pennacchi, who joined in with Manacorda at the 1982 PCI women’s festival and were invited to discuss “women change times.”[819]

The “Women change times” proposal was ultimately not approved by parliament, but certainly created interest in the topic. In the following years, some cities established specific “times and timings” committees. Some recommendations were included in laws that parliament later approved, such as the (relative) liberalization of commercial openings[820] and the acknowledgment that “time” was an important factor in equality.[821]

Despite its modest outcomes, “Women change times” was a very interesting experiment born out of Creative Anger and the criticism of the Black Box Entanglement. By promoting a re-organization of daily schedules from a woman’ perspective, PCI women deeply challenged common assumptions on the optimal organization of society. The women’s proposal therefore also challenged the macro-politics of the Black Box Entanglement, because it questioned the desirability and inevitability of the societal and organizational model it reproduced.

818 See the conference program “Le Donne Cambiano i Tempi, Atto II,” *l’Unità*, November 19, 1990. 4. In the early 1990s, Manacorda was elected as an independent candidate in Milan city council, where she worked on city timing projects. Sandra Bonfiglioli, “Urban Time Policies in Italy: An Overview of Time-Oriented Research,” *Transfer: European Review of Labour and Research* 3, no. 4 (1997): 700–722.

819 Pesce attended the same November 1990 conference as Manacorda; Pennacchi was involved in events on this policy proposal (see advertisement in l’Unitá, April 20, 1990, 22).

820 Ordinamento delle autonomie locali, Pub. L. No. 142 (1990).

821 Azioni positive per la realizzazione della parità uomo-donna nel lavoro, Pub. L. No. 125 (1991).

4. Conclusions: Democratic Socialists against the Black Box Entanglement

Between the early 1970s and the end of the 1980s, the Italian Communist Party served as a catalyst for developing critical and alternative visions against the Black Box Entanglement. There was Technopolitical Resonance among PCI members, and a wider set of intellectuals, researchers, and labor unionists close to the party. Overall, the PCI fostered a re-politicization of computer debates. However, different emotional practices were performed in the process, and not all of them successfully countered the Black Box Entanglement in the long run.

Often, the Black Box Entanglement was countered through emotional practices based on the Principle of Hopeful Curiosity. Starting in the 1970s, PCI computer debates encouraged toning down the most sensationalist perspectives on the societal and political impact of computing. In this way, they addressed both the excessive enthusiasm about computers promoted by foreign commercial actors like IBM, and the excessive concerns by some of the Italian left. The PCI pushed for recognition of the positive aspects of new technologies, and argued for a "PCI road to computers" which should be based on the centrality of human agency, not deterministic faith in technological progress. This powerfully fostered a re-politicization of computer debates. An important contribution in PCI debates came from outside researchers and intellectuals, at times even "dissidents." Although they expressed more radical perspectives than those reflected in the official party line, their contributions were fundamental for the re-politicization of computer debates, both within the party and the left in general. The "socialist use of computers" could not just be based on taking the computer industry away from capitalism. It also entailed placing societal needs always at the center, not by asking "how can a computer solve this problem?" but rather "can this problem be solved by a computer?"

Other emotions were also mobilized against the Black Box Entanglement. The PCI aimed to foster the development of a local computer industry, and not be dependent on foreign multinationals. The influence of the French Communist Party was important in this sense, as their commentary on the French Calculus Plan gave the Italian communists a blueprint for debates about an Italian Calculus Plan. In these debates, PCI members mobilized the Olivetti Missed Opportunity discourse, and also a socialist version of Fear of Falling Behind. The PCI debates on an Italian Calculus Plan, however, failed on two levels: first, they were not able to turn their propositions into a concrete legislative initiative. Second, the "official" party line on the Calculus Plan ultimately fostered a de-politicization of computer debates, as it only focused on macro-economic aspects.

PCI computer debates initially happened within computer conferences, or were started by researchers and computer experts. From the early 1980s, PCI secretary Enrico Berlinguer also increasingly addressed computers in public debates. He amplified the Technopolitical Resonance of the Principle of Hopeful Curiosity, powerfully re-politicizing computer debates in the national arena. From the mid-1980s, however, criticism of the Black Box Entanglement, and the importance of a socialist re-politicization of computers, increasingly faded from the party agenda. At the last PCI conference, which set a new course for the party, some PCI members encouraged a re-politicization of computer debates, but computers (and technological development in general) remained a marginal topic.

One exception was the PCI women's section, that discussed computers seriously in the 1980s, fostering their re-politicization. Socialist women revitalized the criticism of the Black Box Entanglement, by adding a gender perspective not addressed in previous discourses. When women started to question whether the promises of the computer revolution had become true for them, it turned out they were not. This awareness was coupled with the mobilization of Scientific Curiosity and Creative Anger, two emotions which encouraged women to either increase their knowledge about computers or find new ways to overcome the (old) discrimination brought about by the (new) technology.

It seems the PCI's ability to challenge the Black Box Entanglement was directly proportional to its openness to new ideas and political actors. It was greater in the first half of the 1970s, when relations with the grassroots left were still cordial. In the second half of the decade, however, the Socialist Fear of Falling Behind gained more ground, as debates on computers largely became a matter for experts. At national congresses, the need to separate the PCI from the revolutionary left superseded understanding these positions. In the first half of the 1980s, Enrico Berlinguer showed again a pro-active interest in marginalized political actors, such as the party's women and youth sections. But then again, in the second half of the decade, this interest faded, as the party's moderate faction prevailed. The calls for a re-politicization of computer debates in the PCI, from the youth section and the more "radical" area of the party, were not addressed by the party's moderate leadership. As we shall see in the next chapter, the grassroots left were also increasingly uninterested in the PCI's opinion and considerations, and developed their own path outside the Black Box Entanglement.

Chapter 5

Outside the Black Box Entanglement:

Technopolitical Resonance in Italian Libertarian Socialism

And I will wait until tomorrow
to have nostalgia
madam liberty, miss anarchy
as precious as wine, as free as sadness
with your cloud of doubts and beauty

"If they cut you into small bits," Fabrizio de André (1981)[822]

"The fact is that technocracy, the modern version of historical capitalism, is not yet able to scientifically control all the information, thanks to the historical frictions produced by existing cultural habits. This methodological impasse [...] will be fatal for [technocracy]."[823] So claimed *Ma l'amor mio non muore* (But my love will not die, 1971). This book, by former editors of the magazine *Re Nudo*, collected materials from Italian left-libertarian grassroots cultures.[824] Technocracy, capitalism, and the State were harshly criticized. But, in addressing technology, the book aimed to debunk its myths not foster them. It observed how "among the spectacular enemies of computers, nylon panties are among the most dangerous," because by producing static electricity they could ruin computers' memory storage units.[825] And even though the use of video surveillance was undoubtedly increasing, it could be easily tricked by wearing dark glasses and a hat.

The "socialist use of technology" was envisioned as both possible and necessary: "If you want to speak with your comrades in jail, it is more useful to read magazines like *Sperimentale* or

822 "E adesso aspetterò domani // per avere nostalgia // signora libertà signorina anarchia // così preziosa come il vino // così gratis come la tristezza // con la tua nuvola di dubbi e di bellezza," from the album "Fabrizio de Andre." Easily mistaken for a love song, this actually celebrates freedom from a social anarchist perspective. Censored in Italy, the verse"madam liberty, miss anarchy" was changed to "madam liberty, miss fantasy."

823 "Il fatto è che la tecnocrazia, versione moderna del capitalismo storico, non è ancora in grado, a causa degli attriti storici prodotti dalle abitudini culturali, di controllare in modo scientifico tutte le informazioni, e questo impasse metodologico utilizzato dialetticamente con i moderni principi della 'propaganda elettrica', come dicono gli hippies dell'armed electric love, gli sará fatale." Gianni-Emilio Simonetti, Riccardo Sgarbi, and Guido Vivi, eds., *Ma l'Amor Mio Non Muore: Origini, Documenti, Strategie Della Cultura Alternativa e Dell'underground in Italia* (DeriveApprodi, 2008). 55.

824 Simonetti, Sgarbi, and Vivi, eds., *Ma l'Amor Mio Non Muore* (Arcana, 1971), from the 2008 reprint.

825 "Fra i nemici spettacolari dei calcolatori elettronici le mutandine di nailon sono fra i piú pericolosi." Simonetti, Sgarbi, and Vivi, *Ma l'Amor Mio Non Muore*. 59.

Radiorama[826] than so-called president Mao Zedong's four volumes published by Edizioni Oriente."[827] Acquiring technological tools was not expensive, because technology's planned obsolescence ensured a constant supply of cheap components, considered outdated by market standards but still functioning perfectly. And increasing technology know-how was equally easy. "The bourgeoisie is historically stupid,"[828] claimed the book, implying that whatever the bourgeoisie could do, so could the proletariat: "These idiots' advertising says: 'with our course, it will only take one hour per day to become a specialized electronics technician in a few weeks.' Let's show them!"[829]

Between the late 1960s and the early 1970s, it was common to find similar perspectives within Italian left-libertarian movements, as shown in section 2.3.1. The libertarian interest in the socialist use of technology, however, did not have a linear development. During the 1970s, technology was largely ignored by many in the grassroots left. *Re Nudo*, for example, did not show a particular interest in technology after *ma l'amore mio non muore*. And, when the grassroots left did get interested, that was mostly the "capitalist use of machines" in books like *La scienza contro i proletari* (see 3.3). Therefore, the Black Box Entanglement's Technopolitical Resonance was either left unchallenged (as in *Re Nudo*), or at times unwillingly amplified (as in *La scienza contro i proletari*).

Yet, some left-libertarian groups continued discussing the socialist use of computers. One was the Federated Anarchist Groups (Gruppi Anarchici Federati, GAF), a social anarchist collective based in Milan. From the late 1960s, they fostered a renewal of Italian social anarchism, combining classic Italian anarchist literature with new perspectives from outside Italy. These encounters fostered interest in the socialist use of technology. The GAF's interest in computers, however, largely played on the intellectual level. Another political group came from the libertarian area of Autonomist Marxism (Autonomia), who I refer to as "libertarian communists." Their discourses were linked to actual experiments in the socialist use of technologies, most notably telecommunications. The independent radio station "Radio Alice" from Bologna famously

826 *Radiorama* was a radio technology and electronics magazine. *Sperimentale*, (experimental) was likely a similar scientific magazine.

827 "Se volete parlare ai compagni in carcere, la lettura di riviste come *Sperimentale* o *Radiorama* è molto piú utile di tutti e quattro i volumi del cosiddetto presidente Mao Tse Tung delle Edizioni Oriente." Simonetti, Sgarbi, and Vivi, *Ma l'amor Mio Non Muore*, 55.

828 Simonetti, Sgarbi, and Vivi, 58.

829 "La pubblicità di questi idioti dice: 'in qualche settimana con un'ora al giorno soltanto seguendo I nostri corsi diventerai un tecnico elettronico specializzato'. Dimostriamoglielo!" Simonetti, Sgarbi, and Vivi, 59.

exemplified this experimental attitude and eventually its animators also became interested in computers.

These two groups developed their computer discourses independently from each other, but they both challenged the Black Box Entanglement. They both performed emotional practices which fostered hope in the possibility of a socialist, and human-centered use of science and technology, discouraging overly enthusiastic and overly pessimistic views on technological development. In other words, they performed the Principle of Hopeful Curiosity, thus establishing Technopolitical Resonance with Errico Malatesta (founding father of Italian anarchism), Gramsci, Olivetti, dissident Marxist intellectuals and the other actors discussed in earlier chapter. Social anarchists and libertarian communists shared three more emotions: Fear of Falling Inside capitalism or democratic socialism; Creative Anger, fostering new ideas that can address the source of anger; and "Electric Wit," using amusement with a critical and pedagogic intent. I call this "electric" as a reference to Socratic Irony.[830] The destructive power of nylon panties reported above is an example of Electric Wit: it mobilized amusement to criticize the capitalist use of computers and promote a better understanding of their functioning.

In the first section of this chapter, I present the early criticism of the Black Box Entanglement's macro and micro-politics by social anarchists and libertarian communists. Both groups performed emotional practices which re-politicized computer debates and design: the social anarchists mostly based on the Principle of Hopeful Curiosity and Fear of Falling Inside, and the libertarian communists based on Scientific Curiosity and Electric Wit. In the second section, I discuss their common criticism against rigid utopian projects, which challenged the Black Box Entanglement's macro-politics. This criticism coincided with an increase in computer debates, and the symbolic year 1984. The discourses mobilized the Principle of Hopeful Curiosity and Electric Wit, diverging from the typical pessimism in the grassroots left. The third section looks at a new generation of libertarian socialists emerging in the 1980s. They performed emotional practices based on the Principle of Hopeful Curiosity, Electric Wit, and Creative Anger, challenging the Black Box Entanglement's micro and macro-politics. They re-politicized computer debates and design through a political interpretation of cyberpunk literature, which led to the first 1990s Italian hacking communities.

830 Jeremy Bell and Michael Naas explain that Socrates is portrayed as a stingray that electrically shocks or numbs his interlocutors, causing them to question all their previously held beliefs, in "Introduction: Plato's Menagerie," in Plato's Animals: Gadflies, Horses, Swans, and Other Philosophical Beasts (Indiana University Press, 2015), 1–10.

5.1 Libertarian socialists and the Black Box Entanglement in the 1970s

In the 1970s, mistrust of institutional power was growing within the grassroots left. The previous decade saw an increase in grassroots social groups, notably worker and student movements. But while the left grew stronger, so did their internal divisions. The 1969 Piazza Fontana massacre by neo-fascists, and anarchist Giuseppe Pinelli's unjust prosecution and death, fueled the grassroots left's mistrust in institutions.[831] The "capitalist use of machines" was thus more hotly debated than the "socialist use of machines," as science and technology were primarily in Capital and State hands. From this perspective, it was difficult for the grassroots left to envision a "credible" socialist use of computers.

Nonetheless, some groups discussed the "socialist use of computers." Two of them were particularly important in relation to the Black Box Entanglement. One was the Federated Anarchist Groups (GAF).[832] In the early years, the GAF were isolated from the student movements and the rest of the grassroots left. However, the GAF vented crucial criticism of the Black Box Entanglement's macro and micro-politics, by popularizing notions such as "techno-bureaucracy," "liberating technologies," and "intermediate technologies." As we shall see, these concepts questioned Black Box Entanglement's promises and promoted alternative ways to envision technological development. The other group was the libertarian component of Bologna Autonomia, formed around the pirate radio station "Radio Alice" and the independent magazine *A/Traverso*.[833] The Bologna libertarian autonomists combined Italian Workerism's theoretical apparatus with the Situationist movement's left-libertarian spirit. They experimented with the socialist use of communication technologies (and eventually computers), defying the Black Box Entanglement's micro-politics.

This section reviews technology and particularly computer debates, among the GAF and the Bologna autonomists. These groups challenged the Black Box Entanglement, and encouraged a re-politicization of computer debates within the libertarian left. Most of this section focuses on the

831 As seen in section 2.3.1, Pinelli was a founder of the anarchist club "Sacco e Vanzetti" and a mimeograph machine expert.

832 On GAF history: Giampietro Berti, *Contro La Storia. Cinquant'anni Di Anarchismo in Italia (1962-2012)* (Biblion, 2016); Antonio Senta, *Utopia e Azione: Per Una Storia Dell'anarchismo in Italia (1848-1984)* (Elèuthera, 2015).

833 On the history of the Bologna libertarian Autonomia: Luca Chiurchiù, *La Rivoluzione è Finita Abbiamo Vinto: Storia Della Rivista A/Traverso* (DeriveApprodi, 2017); Nanni Balestrini and Primo Moroni, *L'orda d'oro: 1968-1977: La Grande Ondata Rivoluzionaria e Creativa, Politica Ed Esistenziale* (Feltrinelli Editore, 1997).

GAF, as its history spans a longer time period.[834] The GAF established Technopolitical Resonance with Adriano Olivetti and Errico Malatesta by mobilizing the Principle of Hopeful Curiosity. In this way, they fostered a re-politicization of computer debates grounded in the local socialist tradition, similar to democratic socialism. And, like the democratic socialists, this happened when the exchanges with libertarian intellectuals and researchers outside the group were more frequent. The Bologna Autonomia countered the Black Box Entanglement's Technopolitical Resonance through theory, by mobilizing Electric Wit and the Principle of Hopeful Curiosity in their written materials, and in practice, through Radio Alice and exploring new communication tools.

5.1.1 The anarchist computer scientist and syndicalist computer. Early computer debates in Italian social anarchism

The lively political atmosphere of the late 1960s also fostered a renewal in the Italian anarchist movement. Besides the historical Italian Anarchist Federation (Federazione Anarchica Italiana, FAI) and magazines *Umanità Nova* and *Volontà*,[835] new groups and publications appeared. One of the most significant was the GAF, founded mostly by young activists, establishing a fruitful dialogue with the FAI and other anarchist groups. In 1971, the GAF launched the magazine *A-Rivista Anarchica*, which became a key publication in the Italian left-libertarian press. In 1976 they set up the Giuseppe Pinelli Center for Libertarian Studies (Centro Studi Libertari Giuseppe Pinelli). And, from the 1980s, former GAF members (the group officially dissolved in 1979) became *Volontà* editors.

In 1970, the GAF promoted a series of short publications, called *Anarchismo '70*. The first was *Anarchismo '70 – materiali per un dibattito* (Anarchism '70 - materials for a debate).[836] This publication reported an actual debate and is interesting for two reasons. First, two participants in the debate, Antonio Scalorbi and Carlo Doglio, powerfully amplified the Principle of Hopeful Curiosity's Technopolitical Resonance, fostering a re-politicization of computer debates. Second, both had been Olivetti employees. Their interest in computers is also connected to Adriano Olivetti's legacy, which runs deep through the history of Italian socialists' computer debates. His legacy was important for countering the Black Box Entanglement in Italy, because he exemplified the existence of a computer manufacturer different from much hated IBM. In his lifetime, Adriano

834 The GAF was founded in the late 1960s, Radio Alice and *A/traverso* in the mid-1970s.

835 *Umanità Nova* was the anarchist movement's daily (sometimes weekly) newspaper, founded in 1920 by Errico Malatesta and others. *Volontà* was a more theoretical publication, founded in 1944 by Giovanna Caleffi and Cesare Zaccaria.

836 *Anarchismo'70. Materiali per Un Dibattito*, I Quaderni Dell'Antistato 1 (Edizioni de L'Antistato e Volontà, 1970).

Olivetti was a controversial figure within the left, who saw him as a "paternalist master." But, as seen in chapter 4, democratic socialists rehabilitated Adriano Olivetti by mobilizing the "Missed Opportunity" discourse. The anarchists did not do this with Adriano Olivetti, nor his computer enterprise. Rather, the Olivetti-Scalorbi-Doglio connection, I argue, exemplifies Adriano Olivetti's legacy as "a man ahead of his times." To explain this claim, I will talk about Doglio and Scalorbi's lives before discussing their contributions to *Anarchismo '70*.

Both Doglio and Scalorbi belonged to a small anarchist community that worked at Olivetti and lived in Ivrea, the Olivetti company town. Carlo Doglio worked in Olivetti's cultural sector.[837] In 1955, with an Olivetti scholarship, Doglio pursued his professional interests in urban planning and architecture by studying at the University College of London, where he met important left-libertarian intellectuals of the time, such as Paul Goodman, Ernst Schumacher, and Lewis Mumford.[838] These years were fundamental for Doglio's professional and intellectual development. Antonio Scalorbi, on the other hand, was hired at Olivetti (on Doglio's recommendation) as a factory worker.[839] When he started at Olivetti, Scalorbi had only elementary school education. At Olivetti, he was selected to attend a high-school diploma course, and later given a scholarship to attend Bocconi University in Milan. Scalorbi did not graduate from the university, but decided to go back and work at Olivetti. There, he eventually became a manager for its software house, Syntax, where he was a colleague of Paola Manacorda.[840]

The relationship between Adriano Olivetti and the anarchists was ambivalent. On the one hand, it certainly had conflicting aspects. According to another anarchist and former Olivetti employee, architect Giancarlo De Carlo, Adriano Olivetti gave Doglio a scholarship to study in London because he found him increasingly annoying. De Carlo said Adriano Olivetti greatly disliked anarchists, but "he was a gentleman" and thus sent Doglio away instead of firing him.[841] Lina

837 Doglio worked on the *Giornale di Fabbrica Olivetti* (Olivetti factory magazine for workers); then for *Comunità*, the organ of the political movement established by Adriano Olivetti, and finally as editor and translator for Olivetti publishers Edizioni di Comunità.

838 Stefania Proli, "Carlo Doglio," in *Le Vite Dei Cesenati*, vol. 6 (Stilgraf, 2012), 152–82; Stefania Proli, "Carlo Doglio (1914–1995) and the Theory and Practice of Slingshot Planning," *Planning Perspectives* 32, no. 4 (2017): 533–56.

839 AA.VV., "Antonio Scalorbi. Nel Ricordo Dei Suoi Compagni e Amici," 1975, Archivio Biblioteca Libertaria Armando Borghi.

840 See "Acknowledgments" in: Paola Manacorda, *Il Calcolatore Del Capitale. Per Un'analisi Marxista Dell'informatica* (Feltrinelli, 1976).

841 Giancarlo De Carlo, "A Carrara Senza i CC," *A-Rivista Anarchica*, March 1998.

Zucchini Scalorbi, Antonio Scalorbi's widow, recollected how her husband, also a labor unionist, often criticized Adriano Olivetti's paternalist attitude in labor relationships.[842]

However, regardless of their dissents, something certainly brought Adriano Olivetti and the anarchists together. The connection between them went beyond an instrumental and/or professional relationship and was based on Adriano Olivetti being "a man ahead of his time." The Doglio-Olivetti connection was based on Adriano Olivetti being "a man ahead of his time" in his entrepreneur's hat, deeply committed to "humanistic" values and involved in the cultural sector. This connection stemmed from their mutual interest in people-centered and community-centered urban planning, exemplified by their appreciation of Lewis Mumford's work. As mentioned in chapter 2, Olivetti's publishing company Edizioni di Comunità was the first to translate Mumford in Italian. And Mumford became a key intellectual reference for Carlo Doglio,[843] who also translated (for Edizioni di Comunità) Mumford's *The transformation of man* (1956). The Scalorbi-Olivetti connection was based on Adriano Olivetti also being a "man ahead of his time" in the technology sector and in labor relations (a "businessman" and a "master" ahead of his time). They were both involved with computers and committed to progressive labor relations. Scalorbi liked computers, and Olivetti shared and supported his interest. And, when it came to working relations, according to Lina Zucchini Scalorbi, the Olivetti style was ultimately the same as her husband's, prioritizing the workforce's well-being instead of profit.[844] She claimed that, after all, Olivetti was "a different, anomalous company."[845]

The Doglio-Scalorbi-Olivetti connection was not just any kind of connection: it was Technopolitical Resonance. Ten years after Adriano Olivetti's death, here we have Carlo Doglio and Antonio Scalorbi joining in debates on Italian anarchism's renewal, and powerfully amplifying the Principle of the Hopeful Curiosity. Doglio and Scalorbi were certainly familiar with the works of Errico Malatesta. But many anarchists read Malatesta. Yet, it was Doglio and Scalorbi who most significantly amplified the Principle of Hopeful Curiosity in these debates. And, as we shall see, when Doglio and Scalorbi distanced themselves from the GAF, and the anarchist movement in general, this coincided with a decline in anarchist debates on technology, computers in particular. This confirms that in these early computer discourses, Adriano Olivetti's legacy was justifiably

842 Lina Zucchini Scalorbi, "Una Colonia Anarchica All'Olivetti Di Ivrea," *Bollettino Archivio G. Pinelli*, December 2000.
843 Proli, "Carlo Doglio."
844 Zucchini Scalorbi, Una Colonia Anarchica All'Olivetti Di Ivrea.
845 Zucchini Scalorbi, 37.

more significant than Errico Malatesta's in amplifying the Principle of Hopeful Curiosity's Technopolitical Resonance within Italian anarchism.

Antonio Scalorbi authored the introduction to *Anarchismo '70* and a specific article on computers, "The Labor Union's Computer". His introduction put forward a very negative perspective on the societal and political implications of contemporary science and technology. Scalorbi established Technopolitical Resonance with grassroots left's criticism on the capitalist use of computers, questioning the Black Box Entanglement's macro-political promises. Scalorbi mobilized concerns on contemporary techno-scientific development, stressing the dangers resulting from its misuse, from nuclear destruction to society's dehumanization and total control. "Even science and technique, which man expects to contribute to progress, become tools to support government systems in their conservative and repressive action."[846] In other words, the promise of a technologically advanced capitalist society which could bring everyone generalized wealth was a lie, and a dangerous one.

In "The Labor Union's Computer," Scalorbi referred again to modern technology's destructive potential, but presented computers as useful tools for building an anarchist society. Scalorbi remarked on the centrality of human agency in technological development, by mobilizing skepticism over formulations such as "electronic brains." The computer was in fact a very stupid machine, he argued, and calling them "electronic brains" was a huge exaggeration: the responsibility for computer errors and misuse was all human. Scalorbi also criticized the computer industry's drivers and priorities, which were not necessarily geared to the common good. Scalorbi observed: "Human brains—yes these are humans, and very developed—are busy gaining two millionths of a second in a certain operation which, rest assured, has nothing to do with the fact that three quarters of the world's population do not have enough food."[847] With these words, Scalorbi was stressing that the technology sector was involved in a continuous run towards improving technical performance, instead of focusing on how to apply technology to solve actual societal problems. He was thus criticizing the role of Fear of Falling Behind in setting the computer industry's agenda. Scalorbi's criticism, however, did not end there.

846 "Anche la scienza e la tecnica, da cui l'uomo si attende un contributo per il progresso, diventano strumenti la cui funzione serve a puntellare I sistemi di governo nella loro azione conservatrice e repressiva." Antonio Scalorbi, "Introduzione," in *Anarchismo '70. Materiali per Un Dibattito.* (Edizioni de L'Antistato e Volontà, 1970). 5.

847 "Cervelli umani, questi sì umani, e sviluppatissimi, sono impegnati a guadagnare due milionesimi di secondo in una determinata operazione che, state sicuri, non ha niente a che fare con quei tre quarti della terra che soffre la fame." Antonio Scalorbi, "Il Calcolatore Sindacale," in *Anarchismo '70. Materiali per Un Dibattito.* (Edizioni de L'Antistato e Volontà, 1970). 38.

Scalorbi argued that computers could also be envisioned in a different way, mobilizing hope in a human-centered, "socialist use of machines." At the same time, he encouraged scientific curiosity in his comrades. In other words, he amplified the Principle of Hopeful Curiosity. His final question was: "How to make these brains think, little by little?"[848] where the "brains" belonged to the people currently shaping the micro-politics of computers. Scalorbi observed that the Hot Autumn (see chapter 3) was starting to change things: technicians were realizing they should also be involved in workers' struggles and, with this awareness, would be able to program machines for different uses. The anarchist movement, concluded Scalorbi, should have been more present in the workers' movement. Together, they could apply and modify the "most modern [technology] system" (the computer), so that it would serve people's interests.

Unlike Scalorbi, Carlo Doglio did not specifically discuss technological development, but made important references to it. He focused on the notion of "planning" in an article "The harmonic plan – the planning of liberty." Doglio powerfully mobilized the Principle of Hopeful Curiosity, by underlining the relevance of anarchist thought in contemporary debates on planning (that is, the Principle of Hope: unplanned Utopia as opposed to scientific socialism), and by arguing that technological development pointed to the contemporary relevance of anarchism (thereby encouraging Scientific Curiosity). According to Doglio, although it looked like the 1970s were strongly influenced by Marxism, the themes the anarchists brought up were extremely relevant. In particular, Doglio observed that Proudhon's notion of "society" as a place of constant mutation, participation, and invention was central in contemporary societies.[849] Furthermore, technological development was much more accessible than in the past, and could be a tool to practice self-management instead of authoritarian management.

Doglio mobilized the Principle of Hopeful Curiosity together with the Fear of Falling Inside, like the democratic socialists had done. He evoked a fearful scenario of global destruction to reinforce the need for a completely different political system (anarchism). Doglio argued, those who accused anarchists of promoting a return to the Middle Ages were very wrong: "On the contrary, it is only now, with science and technology flourishing, that we see how the 'anarchist approach to regional planning, meant as correlation, on the global scale, of life's plans' is concrete, practicable, and ultimately ineluctable - unless we want to destroy the human species (because of an atomic bomb,

848 "Come far ragionare, a poco a poco, questi cervelli?" Scalorbi, 38.

849 Pierre-Joseph Proudhon (1809-1965) was an anarchist philosopher and political activist, best known for his work on mutualism.

or a biological bomb; or the end of freedom, which is the same as dying). "[850] Doglio's perspective is also noteworthy because combining "planning" and "computers" frequently evoked scenarios of total control. Postulating the possibility (and the necessity, and urgency) of an anarchist planning through computers was fundamental to start envisioning a socialist use of computers outside the Black Box Entanglement's dangerous promises.

In the *Anarchismo'70* debate which followed the presentations, Doglio brought up again the socialist use of technology. He mobilized the Principle of Hopeful Curiosity by stressing the importance of taking technology away from the "technocrats," and using it to promote a left-libertarian society. He observed the danger of ending up as prisoners in the hands of technocrats. "But how are we going to beat technocrats if we don't take their technology away from them, if we don't say: see, how you became the masters of a technology which is useful only for you: in the past [technology] only served the masters of profit, now it only serves you, the masters of power?" Doglio made an important point: to counter the macro-politics of the Black Box Entanglement, it was also important to act on its micro-politics. "Are we going to take this technology away from [the technocrats] only by asking them to include more people in technology development? Surely, we can get to the heart of the problem, without going backward but forward, using the technological processes being developed everywhere in the world in a different way than traditionally."[851]

Doglio and Scalorbi's mobilizing emotional practices had an important impact on fostering a first re-politicization of computer debates among Italian anarchists, and again making the Principle of Hopeful Curiosity resonant. However, the Principle of Hopeful Curiosity was not further amplified in the following years. After the "Anarchismo '70" series, technology was not a key issue, and the GAF did not engage in computer debates. This lack of interest was also related to Doglio and Scalorbi's personal stories. For a time Doglio was disillusioned with the organized anarchist

850 "Semmai è solamente adesso, nel fiorire delle scienze e delle tecnologie, che si avverte quanto concreto, e praticabile, e d'altronde ineluttabile se non si voglia arrivare alla distruzione della specie umana (o di bomba atomica, o di bomba biologica; o di cessazione della libertá che è lo stesso che morte) è lo approccio 'anarchico alla pianificazione regionale, intesa come correlazione, a giro d'acqua su scala mondiale, del piano della vita'." Carlo Doglio, "Il Piano Armonico (La Pianificazione Della Libertá)," in *Anarchismo '70. Materiali per Un Dibattito.* (Edizioni de L'Antistato e Volontà, 1970). 31.

851 "C'è il pericolo di andare verso una prigionia in mano ai tecnocrati, ma come come battiamo il tecnocrate se non gli sottraiamo la sua tecnologia, se non gli diciamo: «guardate che voi siete diventati i padroni di una tecnologia che serve solo a voi: come prima serviva solo ai padroni del profitto, adesso serve solo a voi, padroni del potere»? Gliela sottraiamo limitandoci a chiedere che tutti partecipino a quella stessa tecnologia? O non sarà vero che si può colpire al cuore il problema, senza tornare indietro ma andando più avanti e usando, in modi diversi da quelli tradizionali, i processi tecnologici che vanno in tutto il mondo sviluppandosi?" Carlo Doglio, ed., "Una Discussione," in *Anarchismo '70. Materiali per Un Dibattito.* (Edizioni de L'Antistato e Volontà, 1970). 54.

movement, and did not engage with its activities until the late 1970s. Scalorbi became gravely ill in 1974 and died that year.

5.1.2 From "Technocracy" to "Techno-bureaucracy": the new agents of the Black Box Entanglement

In the early 1970s, the GAF further analyzed and defined the new social class developing contemporary technology as "techno-bureaucracy." Its power was based on the ownership of techno-scientific knowledge rather than means of production. Its agents were not just the usual multinational companies and military-industrial complexes, but also States, including those claiming to be "socialist," such as the Soviet Union or the People's Republic of China. The discourses on techno-bureaucracy help us to better understand the genesis of anarchists' later computer debates. Unbeknown to the anarchists, the notion of techno-bureaucracy accurately described the Black Box Entanglement's influence on the software industry. Furthermore, in its discourse on techno-bureaucracy, the GAF amplified the Principle of Hopeful Curiosity's Technopolitical Resonance through direct references to Errico Malatesta, not through Olivetti's legacy.

The notion "techno-bureaucracy" had its roots in classical anarchist theory. Within the Italian anarchist movement, the term was first used by Luce Fabbri,[852] Italo-Uruguayan anarchist intellectual and daughter of Luigi Fabbri, an Italian anarchism "founding father" and Malatesta's close collaborator and friend. The identification of "techno-bureaucracy" as a new social class started with the "red bureaucracy" notion, first developed by Michail Bakunin, and later discussed by Italian anarchist intellectual Camillo Berneri, Belgian anarchist labor unionist Louis Mercier Vega, and Italian Trotskyist intellectual Bruno Rizzi.[853] In 1939, Rizzi wrote an essay in French, *La Bureaucratisation du Monde* (The Bureaucratization of the World), focusing on "bureaucratic collectivism."[854] In the 1970s, Italian anarchists rediscovered Rizzi's work, coupling it with Luce Fabbri's terminology to describe the emergence of the new "techno-bureaucratic" social class. This

852 Amedeo Bertolo, "Per Una Definizione Dei Nuovi Padroni," in *I Nuovi Padroni* (Edizioni Antistato, 1978); Paolo Finzi, "Il Ruolo Di Luce Fabbri," *A-Rivista Anarchica*, March 2006.

853 Bertolo, "Per Una Definizione Dei Nuovi Padroni."

854 Rizzi's argument is similar to those in the more famous "The managerial revolution" by former Trotskyist James Burnham and led Rizzi to accuse Burnham of plagiarism. This is still an open issue. The reprint of Rizzi's book includes evidence sustaining his accusation. Gianpiero Landi, review of *La burocratizzazione del mondo*, by Bruno Rizzi, *A-Rivista Anarchica*, December 2002.

Italian reflection on “techno-bureaucracy” was later associated with Noam Chomsky’s critique of intellectuals.[855]

An important theoretical document for the development of a “techno-bureaucracy” critique was the GAF’s 1973 political program: “Anarchismo '70. Un'analisi nuova per la strategia di sempre” (Anarchism 70s. A new analysis for the usual strategy). The notion of "techno-bureaucracy" criticized both the capitalist system and the centralized communist system. The GAF saw that “Both systems have a managerial class with a similar sociological composition, which is techno-bureaucracy exercising power thanks to its knowledge (scientific, political, administrative), not because it owns means of production.”[856] But techno-bureaucracy, the GAF observed, was also present in the so-called “Third World,” where the ruling class came either from the military or from State functionaries. Nationalism and autarchy were central in most of these countries and these principles served to overcome colonial dependence, but also fostered techno-bureaucracy’s rise as the next ruling class.

The shift from “material property” to “intellectual property” also happened in the history of computing, with the emergence of the software industry. In this sense, I argue, the concept “techno-bureaucracy” more accurately than “technocracy” describes the actors who amplified the Black Box Entanglement, promoting and maintaining computers as “black boxes.” While computers were made smaller and more accessible, knowledge on their functioning did not become equally accessible. On the contrary, the increased possibility to tinker with computers increased the amount of legal regulations prohibiting this tinkering. Computer hardware innovations were already protected by patent laws, but new regulations were drafted specifically for software.[857] And, as discussed in chapter 1, new social movements emerged to counter these regulations, most notably the Free Software Movement. From the mid-1970s, not just “technocrats” from the military-industrial complex or computer industry worked to maintain computers as closed, black-boxes. They were aided and supported by governments, policymakers, courts of law. This was a much wider apparatus, involving people who did not intervene directly in technology design, yet sustained the Black Box Entanglement’s micro-politics.

855 Robert Graham, *Anarchism: A Documentary History of Libertarian Ideas. Volume 2.* (Black Rose Books, 2009). xi.

856 “Entrambi i sistemi presentano una classe dirigente con composizione sociologica simile, cioè una tecnoburocrazia che esercita il potere in virtù delle conoscenze (scientifiche, politiche, amministrative) che detiene, e non mediante il possesso materiale dei mezzi di produzione.” Gruppi Anarchici Federati, ed., *Anarchismo ’70. Un’analisi Nuova per La Strategia Di Sempre*, I Quaderni Dell’Antistato 3 (Edizioni de L’Antistato, 1973). 56.

857 Gerardo Con Diaz, “The Text in the Machine: American Copyright Law and the Many Natures of Software, 1974–1978,” *Technology and Culture*, 2016, 753–79.

Between late 1974 and early 1975, three articles in *A-Rivista Anarchica* specified the relationship between techno-bureaucracy and scientific thought, starting with Malatesta's critique of Kropotkin's determinism.[858] These articles, published at a time when the GAF was again discussing technological development, also encouraged a re-politicization of technology debates. The GAF was hereby amplifying the Principle of Hopeful Curiosity through a regulating emotional practice. They framed their own notion of techno-bureaucracy within the international and Italian anarchist tradition, not to show how they differed, but how they fitted within it. In this sense, these articles performed a regulating emotional practice, not mobilizing, because they sought to delineate a specific intellectual and emotional attitude to techno-scientific development, which from the anarchist tradition's perspective, was the "appropriate" one.

The articles had a self-explanatory subtitle: "Anarchists and science" and were signed by Mirko Roberti, a pseudonym used by GAF co-founder Nico Berti. He noted that, according to Malatesta, science was neutral, and for this reason could be used for either good or bad ends. But, as Berti pointed out, precisely because of this neutrality, science was a form of ineluctable, unquestionable "pure power." And its governance was not neutral at all: the "government of science" rapidly became the "government of scientists," which is the government of techno-bureaucracy.[859] Berti stressed how deterministic and positivist perspectives had always been criticized by the anarchist movement, thereby regulating the Principle of Hope as the appropriate attitude towards science and technology (instead of scientific socialism). For example, Berti referred to a statement by Bakunin which unequivocally regulated excessive enthusiasm towards science as undesirable: "even if they were positivists, Auguste Comte's disciples, or disciples of the doctrinaire school of German socialism, [scientists' governance] would inevitably become helpless, ridiculous, inhumane, cruel, oppressive, exploitive and malignant."[860]

Berti also performed a regulating emotional practice sanctioning Scientific Curiosity as a desirable, fundamental emotion for anarchists. He observed that improving the working classes' techno-

858 Mirko Roberti, "Scienza e Ideologia," *A-Rivista Anarchica*, November 1974, "Il Sapere Come 'Proprietà' Dei Nuovi Padroni," *A-Rivista Anarchica*, December 1974, "Dalla Necessità Alla Libertà," *A-Rivista Anarchica*, February 1975.

859 Berti intended "science" to have the wider meaning of "codified knowledge about something": "government science," "administration science" and other techno-bureaucracy tools were also faces of this "pure," "neutral" power.

860 "Fossero anche dei positivisti, dei discepoli di Augusto Comte, o anche dei discepoli della scuola dottrinaria del socialismo tedesco, non può essere che impotente, ridicolo, inumano, crudele, oppressivo, sfruttatore e malefico." Michail Bakunin in Roberti, "Scienza e Ideologia."

scientific education was crucial in the anarchist tradition. This improvement was necessary to identify the lies "hidden under the guise of science,"[861] and to free people from their material necessities and nature's dominance. Ultimately, Berti concluded, anarchism and science were two parallel ways to achieve freedom: "It is rational and scientific to dominate the material world (*relative* dimension of freedom), it is anarchist and revolutionary to break man's yoke (*constitutive* dimension of freedom)."[862]

Berti further discussed the relationship between techno-bureaucracy and the notion of science as "pure power" in 1978. That year, the Pinelli Center for Libertarian Studies and the magazine *Interrogations* organized an international conference in Venice, "The New Masters" on techno-bureaucracy. Nico Berti gave an overview of techno-bureaucracy within anarchist thought.[863] He stressed how techno-bureaucracy's development has resulted from the increasing centrality of science in contemporary Western societies. Modern science undoubtedly started as a product of capitalism, Berti observed, but science soon evolved into such an important center of power that it became an independent entity. This generated a new class, "the intellectual class," which based its power on owning a specific type of property: intellectual property. And here, according to Berti, lay the problem with Marxism: it only abolished material property in strictly economic terms. But it did nothing about other forms of property—and therefore power.

Debates on techno-bureaucracy thereby fostered a re-politicization of technology debates, particularly on the macro-political level. The notion of techno-bureaucracy mobilized mistrust not only in the "capitalist use of machines," but also in the "socialist use of machines," as proposed by scientific socialism. The GAF, though, also offered a de-politicized perspective on science and technology in Marxist theory, because they predominantly focused on scientific socialism. The broader analysis of techno-bureaucracy certainly applied to the Italian Communist Party. However, as we have seen in section 2.1, Gramsci amplified the same Principle of Hopeful Curiosity as Malatesta. And, in the 1970s, PCI members and dissident Marxist intellectuals were also critical of scientific socialism, although the GAF did not publicly engage with this literature.

861 Errico Malatesta in Roberti, "Dalla Necessità Alla Libertà."
862 "È razionale e scientifico dominare il mondo delle cose (dimensione *relativa* della libertà), è anarchico e rivoluzionario abbattere il giogo degli uomini (dimensione *costitutiva* della libertà)." Roberti. (Italics in original).
863 Nico Berti, "La Tecnoburocrazia e Il Pensiero Anarchico," in *I Nuovi Padroni* (Edizioni Antistato, 1978).

5.1.3 “Liberating” and “Intermediate” technologies. Computers for self-management

While Italian anarchists were developing the notion of techno-bureaucracy, two authors were analyzing in depth what it could mean to re-politicize technology micro-politics from a libertarian perspective. The first was Murray Bookchin, political philosopher and labor unionist, renowned for his work on “libertarian municipalism” and “social ecology.”[864] Bookchin argued it was possible to envision and build “liberating technologies,” which could help humanity achieve a more sustainable, equal, and free society. The second was economist Ernst Friedrich Schumacher, author of the book *Small Is Beautiful: A Study of Economics As If People Mattered.*[865] In this work, Schumacher developed the notion of “intermediate technology,” to identify a technology more efficient than “traditional” technologies, but also less costly and more sustainable than the “advanced” technology used in modern industrial societies. By the first half of the 1970s, reviews of Bookchin’s and Schumacher’s works were published in two largely ignored articles in Italian academic journals.[866] Later in the decade, anarchist intellectuals and activists helped popularize their work through editorial initiatives and public conferences. Interestingly, the Italian circulation of Bookchin and Schumacher’s works emphasized their perspective on technology. These works are therefore important for Italian libertarian computer debates because they amplified the Principle of Hopeful Curiosity, in a period when debates on technology were very scarce.

The two concepts “liberating” and “intermediate” technologies mobilized hope for the possibility of a socialist use of computers and, although they generated mixed reactions among anarchists, were an important example of how to envision a micro-politics of computer design outside the Black Box Entanglement. Bookchin was at times very enthusiastic about technological development, but in a different way than those motivated by scientific socialism. Concepts like “liberating technologies” were not aimed at greater tech-skill sharing in multinational computer companies, like the IBM worker unions’ discourses; nor to establish greater State control over local computer development and use, as the Italian Communist Party argued. Bookchin and Schumacher proposed a different approach to technology design and use. They stressed the need to broaden the range of actors involved in technological development, and rejected a linear model of technological development: “intermediate” and “liberating” technologies were not chosen for their technical sophistication, but

864 Murray Bookchin, *Post-Scarcity Anarchism* (Ramparts Press, 1971).
865 Ernst F. Schumacher, *Small Is Beautiful: Economics as If People Mattered* (Blond & Briggs, 1973).
866 Ernst F. Schumacher, “Il Piccolo è Bello: Un Problema Di Dimensione,” *Rivista Il Mulino* 24, no. 5 (1975): 729–40; Murray Bookchin, “(Unknown),” *Bollettino Della Società Di Studi Politici*, no. 13–14 (November 1973). Bookchin is quoted in: Redazione A-Rivista anarchica, review of *Post-Scarcity Anarchism*, by Murray Bookchin, *A-Rivista Anarchica*, April 1974. I was not able to retrieve the original article.

for their societal significance. This deeply challenged Fear of Falling Behind: not just on the macro-political level, but also on the micro-political one. There was no risk of "falling behind" other technologically advanced societies, because each society needed different technologies.

Italian anarchists were officially introduced to Bookchin in 1974, when both magazines *A-Rivista* and *Volontà* published a translation of his essay "Technology and the libertarian revolution,"[867] a chapter from *Post-scarcity anarchism* (1971). Both magazines warned that some of the author's ideas might be unpopular, if not questionable, for Italian anarchists. However, the magazines both agreed on its theoretical importance. Bookchin's essay discussed whether technology could help or hinder the establishment of a libertarian and communitarian society. He observed: "The problem is whether future society will be organized around technology, or if technology is sufficiently malleable to be organized around society."[868] This was still an open question for Bookchin, and the second option was possible.

Bookchin powerfully mobilized the Principle of Hopeful Curiosity, by commenting on the centrality of human agency and human values in technological development, and encouraging the libertarian movement to engage more with technology. He stressed that technology could be used to follow "humanitarian" principles, freeing humans from a wide range of exhausting or repetitive jobs. Technology was not applied in this way due to existing micro-political arrangements, not because of incompatibility between technological development and left-libertarian political traditions. Bookchin illustrated how various technologies functioned, specifically drawing attention to how their use had become increasingly accessible and pervasive. He described how computers had changed from the large mainframe, such as the ENIAC, to smaller and more versatile machines. He pointed out the undeniable tendency to create a bureaucratic man-machine system, but ignoring technology was not a solution. It was, in fact, possible to envision an "ecological use of technology" as he termed it, in a liberated society.

Small is beautiful by Schumacher, was first translated and published in Italian in 1977.[869] The book amplified the Principle of Hopeful Curiosity's Technopolitical Resonance, with its emphasis on

867 Murray Bookchin, "Tecnologia e Rivoluzione Libertaria," *Volontà*, March/April 1974 (the entire article), and in *A-Rivista Anarchica*, August/September 1974 (only excerpts). The interest in Bookchin started because GAF member Paolo Finzi read *Post-scarcity anarchism* while in London. Simone Borselli, "Dossier Murray Bookchin: Il Dibattito Su 'A," *A-Rivista Anarchica*, October 2006.

868 "Il problema è se la società futura sarà organizzata attorno alla tecnologia, oppure se la tecnologia è ora sufficientemente malleabile per poter essere organizzata attorno alla società." Bookchin, "Tecnologia e Rivoluzione Libertaria," August 1974.

869 Ernst F. Schumacher, *Il Piccolo è Bello: Una Tecnologia Dal Volto Umano* (Moizzi, 1977).

human need as driver of technological development, as well as curiosity about technology, and the possibility of a "socialist use of machines." The first Italian publication was curated by Carlo Doglio. He was not actively participating in the Italian anarchist movement at the time, but his involvement with Schumacher's book proved he had not abandoned his interest in libertarian ideas.[870] As mentioned in 5.1.1, Doglio had met Schumacher during his years in London. The book's first Italian edition was marketed as a work on technology. Its subtitle was changed to *Il Piccolo è Bello: Una Tecnologia Dal Volto Umano* ("Small is beautiful: Technology with a human face"), based on a chapter discussing technology. The publisher's introduction focused on the notion of "intermediate technologies," the term Schumacher chose to describe technologies modeled on users' actual needs. The preface written by Carlo Doglio discussed the book in more general terms, stressing it belonged within the libertarian political tradition. The book's second edition was printed by Mondadori, a major Italian publisher. This time the title reverted to the original, *Piccolo è bello: uno studio di economia come se la gente contasse qualcosa* (Small is beautiful: A study of Economics as if people mattered).[871] *Small is Beautiful* had a tremendous impact, because it described an industrial dimension that was already typical in Italy.[872] Oddly, the book ended up being more influential within entrepreneurial and political circles than in the anarchist movement—and these circles' approval might have been a factor in the movement's disapproval. But the anarchists were not indifferent about the book.

In 1979, the themes that Bookchin and Schumacher discussed converged in an international conference organized by Centro Studi Libertari G. Pinelli, together with the international anarchist magazine *Interrogations*. The conference theme was "Self management," and one of the thematic tracks "Small is beautiful." Murray Bookchin took part in these sessions alongside Carlo Doglio and others. This conference can be considered a turning point in the anarchist movement's increased interest and curiosity about the socialist use of technology, computers in particular. In the same year, Bookchin's *Post-Scarcity Anarchism* was fully translated into Italian for the first time, by left-libertarian publisher La Salamandra.[873]

870 The original edition's introduction by Theodor Roszark clarified the book's political stance: "Schumacher's work belongs to the subterranean tradition of organic and decentralist economics whose major spokesmen include Gustav Landauer, Tolstoy, William Morris, Gandhi, Lewis Mumford, and, most recently, Alex Comfort, Paul Goodman, and Murray Bookchin. It is the tradition we might call anarchism." Theodore Roszak, "Introduction," in *Small Is Beautiful: A Study of Economics As If People Mattered* (Perennial Press, 1975). 3-4.

871 Ernst F. Schumacher, *Il Piccolo è Bello: Uno Studio Di Economia Come Se La Gente Contasse Qualcosa* (Mondadori, 1978).

872 See: Carlo Carboni, "L'occupazione Senza Crescita e Lo Sviluppo Socialmente Sostenibile," *Il Mulino* 53, no. 1 (2004): 90–100; Piero Bolchini, "Distretti Industriali e Grande Impresa Dal Dopoguerra Alla Globalizzazione," *Rivista Di Storia Economica* 24, no. 2 (2008): 225–40; Michael L. Blim, *Made in Italy: Small-Scale Industrialization and Its Consequences* (Praeger New York, 1990).

873 Murray Bookchin, *Post-Scarcity Anarchism* (La Salamandra, 1979).

During the conference, the Principle of Hopeful Curiosity was powerfully amplified. This happened through mobilizing emotional practices (see below), and a larger regulating emotional practice which emerged as an outcome of the conference. Both before and after the meeting, the GAF expressed its increasing commitment to finding a "socialist use of machines," stressing the centrality of human agency in technological development. This meant that both anti-technology positions and technological determinism (in the style of scientific socialism) were undesirable emotional attitudes for anarchists. Hope and curiosity about a human-centered technology were "regulated" as desirable emotions. For example, the GAF organized a pre-seminar meeting to determine the most important issues for the debate, highlighting that "new technologies" were the tools to achieve a "free and self-managed cultural dimension."[874] In the ensuing years, articles discussing the left-libertarian use of computers increased in anarchist publications.[875]

At this 1979 seminar, Amedeo Bertolo, a GAF member, described self-management as a "subversive scutch" that could penetrate any openings in the system. He performed two mobilizing emotional practices, one based on the Principle of Hopeful Curiosity and another based on Fear of Falling Inside. Bertolo noted that some self-management principles were becoming popular in society at large, however, not yet enough to really challenge the system. Bertolo mobilized Fear of Falling Inside by noting how self-management could also be a tool for techno-bureaucracy, which promised to develop "participatory" systems where ultimately very little power was shared. Bertolo observed that the slogan "Small is beautiful" was attracting much attention in Italy, even among entrepreneurs. But this interest went hand in hand with the usual problems of Italian entrepreneurship, such as illegal work, tax evasion, and ecological destruction. On the one hand, Bertolo noted, the idea that "small is beautiful" fostered a decentralization of power. But, on the other hand, this power was merely being "disaggregated" not "disintegrated" as the anarchists wanted. Even the practice of self-management could fall under techno-bureaucracy. However, Bertolo also mobilized the Principle of Hopeful Curiosity, by pointing out that books like *Small is Beautiful* showed that it was indeed possible to have "a different technology, smaller in scale, which could be a tool for mankind and not something for which mankind becomes a tool."[876]

874 "Autogestione," *A-Rivista Anarchica*, April 1979.

875 For example, in 1980, Volontà published a special issue on "libertarian technology" including computer expert John McEwan's article on using cybernetics for "self-managing systems in evolution," also theorized by Stafford Beer, and linked to Kropotkin and Prodhoun theories on human cooperation and the mutating nature of human society. John McEwan, "Cibernetica Dei Sistemi Auto-Organizzati," *Volontà*, 1980.

876 "Una diversa tecnologia, di piccola scala, che sia strumento dell'uomo e non di cui l'uomo sia strumento." Amedeo Bertolo, "La Gramigna Sovversiva," *Interrogations*, June 1979. 24

Bookchin also discussed the misuse of "self-management" particularly in connection with technological development. Like Bertolo, Bookchin mobilized both the Principle of Hopeful Curiosity and Fear of Falling Inside. He observed that self-management was an alternative to traditional hierarchical management, but having a non-hierarchical social context was not enough. It was also necessary to foster the use of non-hierarchical technologies and smaller technologies, which in many cases could replace the traditional large-scale industrial organization (Principle of Hopeful Curiosity). Bookchin called these smaller technologies "popular technologies." Their appropriation from libertarian movements was even more important now, he argued, because otherwise "popular technologies" risked being appropriated by the technocratic and managerial elites (Fear of Falling Inside).

Less optimistic perspectives on technological development were also discussed at the conference, but these did not reject a libertarian use of technology. Rather, they emphasized the importance of re-politicizing technology debates. For example, ecologist Dario Paccino stressed the many ways contemporary technological development destroyed the environment. But he also pointed out the changes, at both the micro and macro-political level, which could help shape a different model for technological development, beyond the "capitalist use of machines."[877] Paccino was, like Marcello Cini, both a scientist and a sharp critic of techno-scientific development's misuse. His role was particularly important for the anti-nuclear movement. But, like Cini, Paccino was not advocating a total rejection of scientific and technological development. He did not encourage an "anti-technology" stance, incompatible with Scientific Curiosity.[878] He felt that the dangers embedded in the contemporary model of technological development made it even more important to gain techno-scientific knowledge.

The Italian anarchists also explicitly addressed the relationship between anarchism and "anti-technology" attitudes. Another layer in late 1970s debates on technology and anarchism came from the magazine *An.Archos*, established in 1979 by Roberto Marchionatti, Piero Flecchia, and Arturo Schwartz. The *An.Archos* group curated the 1979 Italian edition of Bookchin's *Post-Scarcity*

877 Dario Paccino, "Autogestire Quale Tecnologia?" *A-Rivista Anarchica*, Summer 1979.

878 His work inspired the authors of the 1974 book *La scienza contro i proletari*. As seen in 3.3, its negative perspective on technological development was not always supported by empirical evidence or a critical evaluation of the sources. The authors recollect that Paccino gave them feedback, observing that they used very alarmist tones, and their research was not deep enough. Paccino encouraged them to also look into positive experiences of grassroots science and technology re-politicization, not only science and technology misuse. Daniele Barbieri, "Ricordando Dario Paccino" (La Bottega del Barbieri (blog), June 5, 2015), https://www.labottegadelbarbieri.org/ricordando-dario-paccino-2/, accessed September 20, 2022.

Anarchism. In that year *An.Archos* edited a special issue on "Rationality, Technique and Domination." It is particularly interesting to look at this volume in connection with Bookchin and Schumacher . Their works mobilized the Principle of Hopeful Curiosity in the Italian anarchist movement whereas the *An.Archos* special issue explored more in depth the reasoning which evoked the opposing reactions, namely the "anti-technology" attitudes also emerging within the left.

An.Archos offered a perspective on "resistance to" or "fear of" technology which neither marginalized nor magnified it. The editors thus performed a regulating emotional practice, which framed "resistance to/fear of" technology as an acceptable emotional attitude from an anarchist perspective, but not as the end point of the anarchist reasoning on technological development. For example, technology sabotage was presented as a politically significant act, not framed as a final, desperate gesture against an immovable and totalizing system. Technology sabotage was seen as proving the fallibility of every technological system. Stressing this aspect is important because, as discussed in chapter 3, envisioning technology as a totalizing system could lead to discourses which, albeit unwittingly, ultimately reinforced the Black Box Entanglement. On the other hand, as seen in chapters 1 and 4, marginalizing these perspectives by calling them "computerphobic" or "catastrophist" did not foster a greater understanding of the societal issues at stake. Computerphobia research explicitly amplified the Black Box Entanglement whereas the *An.Archos* special issue sought to understand the phenomenon of "resistance to/fear of" technology, and underline the significance of human agency in this phenomenon. *An.Archos* was fostering a double re-politicization: of technological development and protest activities informed by "resistance to/fear of" technology.

The special issue's first article, by Geoffrey Pearson, focused on "resistance to technology."[879] He aimed to show that acts of sabotage or violence against machines, common in the second industrial revolution, should not be seen as "irrational" responses. Pearson observed that "these behaviors, usually judged as useless, meaningless, disordered and irresponsible, irrational and without a goal, actually have a meaning and are responses to rational motivations."[880] According to Pearson, the various explanations given for these acts also came from different approaches to history. The "History from Above" fostered the former understanding of technology sabotage as an irrational

879 Geoffrey Pearson, "Opposizione Alla Macchina," *An.Archos*, 1979.

880 "Questi comportamenti, giudicati solitamente inutili, privi di senso e di significato, disordinati e irresponsabili, irrazionali e senza scopo, hanno invece un senso e rispondono a motivazioni razionali." Geoffrey Pearson, "Opposizione Alla Macchina," *An.Archos*, 1979, 7.

and meaningless act. Conversely, looking at history "from below" allowed a more thorough understanding of sabotage's rationality.

A similar theme was also addressed in Piero Flecchia's article "Machines, Science, Domination."[881] Flecchia discussed the Luddites, a 19th century organization of textile workers famous for destroying textile machines.[882] The term "Luddite" became over time a synonym for being "anti-technology" or fearful of technology. Flecchia, however, stressed that the Luddites' negative reputation as ignorant people who feared technology was undeserved. Flecchia explained that for the Luddites, skilled textile craftmanship was under threat. Their revolt was at the heart of two contradictory representations of machines: on the one hand, representing those subjected to power, who wanted a technology that fulfilled their daily needs; on the other hand, representing those who held power, who produced "increasingly incorporated and all-embracing automata to achieve dominance."[883] The Luddites were proof that "domination machines" were never passively embraced by the dominated.

By the end of the 1970s, the social anarchists had debated the various political aspects of technological development, countering the Black Box Entanglement's Technopolitical Resonance. Bookchin and Schumacher had fostered a re-politicization of the micro-politics of technological development, making Fear of Falling Behind a pointless threat. The anarchists had critically addressed anti-technology attitudes, further deepening political reflection on the contemporary significance of technological development. However, these were largely theoretical debates. Although the anarchists were increasingly interested in the "socialist use of machines," they did not explore what it could mean to practice it. On the practical level, technology remained a black box.

5.1.4 "The (computer) revolution is over, we won." Exploring new technologies' revolutionary potential

Libertarian communist groups were also interested in the socialist use of machines, especially the Bologna-based libertarian Autonomia, linked with the magazine *A/traverso* and Radio Alice. They faced the Black Box Entanglement with an ironic and laid-back attitude, focused on how to re-politicize technology rather than analyze why it was not possible. This made them different from other Autonomia groups, that focused their analysis only on the Black Box Entanglement's negative

881 Pietro Flecchia, "Macchine Scienze Dominazione," *An.Archos*, 1979.
882 Johan Schot, "The Contested Rise of a Modernist Technology Politics," in *Modernity and Technology*, by Thomas J. Misa, Philip Brey, and Arie Rip (MIT Press, 2003), 257–78.
883 Flecchia, 77.

implications. The Bologna group and its animator, activist and philosopher Franco "Bifo" Berardi were influenced by French philosophers Gilles Deleuze and Felix Guattari. However, the group also had significant connections with Italian left-libertarian debates. For example, Bifo shared an interest in dadaism with *An.Archos* founder Arturo Schwarz, who was an internationally renowned expert on surrealism and dadaism. And the notion of society as constantly "mutating," which became central in Bifo's writing following the same line as Deleuze and Guattari, was also a Proudhon concept that Carlo Doglio referred to in *Anarchismo'70*.

Bologna libertarian Autonomia's computer debates featured two mobilizing emotional practices: first, the mobilization of Electric Wit, used to ridicule power structures and authority figures, but also to tone down the "catastrophist" perspectives on automation and technology as constant threats for the working class, thus opening up the possibility of their socialist use. Second, the mobilization of the Principle of Hopeful Curiosity. This happened not just in theory but mostly in practice. The Radio Alice experience exemplified a "socialist use of machines."

The Bologna libertarian Autonomia was one of the groups that established Technopolitical Resonance with the late 1960s/early 1970s libertarian youth-movements, by mobilizing Electric Wit. The early libertarian grassroots movement collection *Ma l'amore mio non muore (1971)*, exemplifies how Electric Wit was mobilized in technology discourses at the time, countering the Black Box Entanglement's Technopolitical Resonance by ridiculing its promises. For instance, to poke fun at technology, the book contained a table listing the different effects and characteristics of various drugs, from cocaine to alcohol.[884] "Technology" (together with "television" and "ideology") was also listed. Through this table, the authors amusingly and cleverly criticized contemporary technological development, by mocking the excessive enthusiasm for technology that characterized the Black Box Entanglement's macro-politics. The table detailed the dangers of drug addiction, abuse, withdrawal symptoms, and how to take various drugs ("Technology" was "electrically administered"). Some technology abuse symptoms were "euphoria," "developing a mythological attitude," or a "mystical attitude." Technology withdrawal symptoms included anxiety, depression, and panic. Technology was also just as lethal as heroin and other strong drugs because it could cause death if taken in excess. The other dangers of technology abuse were physical and psychological dependence, addiction, psychosis. This table might seem to be presenting an "anti-technology" position. However, as we have seen earlier in this chapter, the book also encouraged

884 Simonetti, Sgarbi, and Vivi, *Ma l'amor Mio Non Muore*. 134.

experimenting with new technologies, and a re-politicization of electronics and communication technologies.

The Bologna libertarian Autonomia also countered the Black Box Entanglement's Technopolitical Resonance through Electric Wit, by challenging the idea that technological development would inevitably bring about a capitalist society. One example is the iconic slogan: "Lavoro zero // reddito intero // tutta la produzione // all'automazione" (zero work and full wages, all production to automation). The "refusal of work" was a key theme in Italian Autonomist Marxism, first developed in the early Workerist writings and then most famously by philosopher and activist Antonio Negri.[885] In the first half of the 1970s, "refusal of work" mostly meant strikes, blockades, and similar protests. This notion initially countered the Black Box Entanglement, because it mobilized mistrust in the idea that technological development would inevitably improve working conditions. At times, however, this emphasis on the "capitalist use of machines" ended up reinforcing the credibility of the Black Box Entanglement's promises (see chapter 3.3). Workers frequently saw technology as a threat (the capitalist use of machines), because it prevented or punished the "refusal of work." *A/traverso* overturned this idea: technology should not be seen as hindering the refusal of work, but as a tool to achieve it.

In Bologna, Electric Wit also met the Principle of Hopeful Curiosity. The magazine *A/traverso*, founded in 1975, was a famous project by the Bologna libertarian Autonomia. From its first edition, it stressed the importance of techno-scientific knowledge for social movements. These claims mobilized hope in a "socialist use of machines" driven by human agency and needs, in a period when the perspective of techno-scientific knowledge was often pessimistic. They fostered Scientific Curiosity, by stressing the importance of this knowledge and by encouraging scientists and engineers to join their political struggle. As usual, the Bologna group's perspective on technological development was heavily influenced by Marx's *Grundrisse*. But *A/traverso* stressed the wider "proletarization of intellectual labor" rather than the specific "proletarization of technicians" seen in sections 3.2/3.3. The proletarization of intellectual labor did not hinder the socialist use of technology: on the contrary, it reinforced the socialist revolution (meant as a radical cultural and societal transformation, not an armed revolution).[886] Intellectuals, meant to be all the people who had specialized knowledge, whether humanistic or techno-scientific, could now take part in this revolution, side by side with the workers.

885 Chiurchiù, *La Rivoluzione è Finita Abbiamo Vinto*. 71. See also: Matteo Pasquinelli, "Italian Operaismo and the Information Machine," *Theory, Culture & Society* 32, no. 3 (2015): 49–68.
886 A/traverso, "Quaderno 1," 1976, 1.

Technology discourses by the Bologna left-libertarian Autonomia inevitably intersected, and were influenced by, the wider political context. In 1977, a new, mass mobilization by the grassroots left generated "The '77 movement," known for its creativity and libertarian spirit. This period, however, also saw an increased level of violence, both by protesters and the State. On March 11, Francesco Lorusso, a Continuous Struggle militant, was killed by the police during a demonstration in Bologna. The movement's response was massive, particularly visible in the university area of the city. On March 13, thousands of policemen were sent to retake the university area, aided by three military vehicles (often referred to as "tanks" in the left-wing press, although these were armored people carriers not combat vehicles). Radio Alice members were arrested because they had reported the protest. Franco Berardi managed to escape arrest, and fled to France where he found refuge.[887]

In this period, *A/Traverso* published a series of spin-off articles centered on "La Rivoluzione" (The Revolution). The magazine constantly mobilized Electric Wit, starting with its titles (*The Revolution; The Half Revolution; The Revolution is not Clandestine; The Revolution is Over, We Won*). This series is interesting because the group, beside Electric Wit, continued mobilizing the Principle of Hopeful Curiosity, despite the very tense atmosphere and the personal fortunes of the *A/traverso* founders. They frequently appealed to scientists and technicians. In *La Rivoluzione a metá* (The half Revolution), the group made a call for action directed at the (politicized) scientific community: "Until today, capital has used science, technique, invention, and intelligence to control work, to boost profit, to increase exploitation. Now it is enough. Comrades, technicians, scientists, intellectuals. FREE YOUR INTELLECT!"[888] This sentence powerfully mobilized the Principle of Hopeful Curiosity, because it stressed the significance of techno-scientific knowledge as a fundamental tool in a socialist society (appealing to technicians and scientists as "comrades"), while stressing the centrality of human agency ("free your intellect!") as a driver of technological development. Furthermore, *La Rivoluzione a Metà* observed that "It is possible to substitute work with machines, cybernetics, and applied computer science. It is possible to scientifically organize essential social services, freeing life from work's constriction."[889] Although the magazine spoke of "scientifically organize," this was not the same thing as scientific socialism. Techno-scientific

887 Chiurchiù. *La Rivoluzione è Finita Abbiamo Vinto.*

888 "Fino ad oggi il capitale ha usato la scienza, la tecnica, l'invenzione, l'intelligenza, per controllare il lavoro, per organizzare l'aumento del profitto, per accrescere lo sfruttamento. Ora basta. Compagni tecnici, scienziati, intellettuali. LIBERATE L'INTELLIGENZA!" A/traverso, "La Rivoluzione a Metà," March 19, 1977, 2

889 "È possibile sostituire il lavoro con le macchine, con la cibernetica e con l'informatica applicata. È possibile organizzare scientificamente i servizi indispensabili liberando il tempo di vita dalla costrizione del lavoro." A/traverso. 2.

knowledge was not picked out as the leading force to establish socialism, but one among many. The following edition of this *A/travero* spinoff, *La Rivoluzione non è clandestina* (The Revolution is not clandestine), further amplified the Principle of Hopeful Curiosity. The authors noted that "Techno-bureaucratic society saw its mediation chains and consensus apparatus dangerously shaken."[890] The centers where techno-scientific knowledge was produced, however, had not been completely re-appropriated. Thus, *La Rivoluzione non è clandestina* argued for the creation of a "movement of barefoot engineers."[891] In *La Rivouzione è finita abbiamo vinto* (The Revolution is over, we won), the group published a series featuring the new society they envisioned, including the "construction of automated factories,"[892] further stressing the positive role of techno-scientific knowledge for socialism.

The Bologna libertarian Autonomia's focus on the socialist use of machines did not only consist of witty slogans and appeals for "barefoot engineers." The group also experimented materially with alternative uses of technology, starting with the radio. They stressed the importance of "information" for contemporary capitalism. Therefore, "information" had to be appropriated by the left. In 1976, following a liberalization of radio frequencies, *A/traverso* members founded an independent radio station which became legendary in the history of Italian social movements, Radio Alice. Although not a computer technology, Radio Alice exemplified what it could mean to challenge at once the Black Box Entanglement's macro and micro-politics. On the practical level, setting up a radio station also implied gaining technical knowledge on electronics, communication technologies and the like. In other words, practice the kind of tinkering that was discouraged by the Black Box Entanglement. And the radio programs were of course very critical of everything related to US Cold War capitalism. This was a way to challenge the technologically advanced capitalist society promised by the Black Box Entanglement.

The interest in the re-politicization of information and communication technologies paved the way for the encounter between Italian left-libertarian culture and US hacker culture. From the late 1970s, the Bologna libertarian communists increasingly discussed how to open computers' black-box. In 1981, Alberto Benini and Maurizio Torrealta published the book *Simulazione e Falsificazione. Il segno come valore: semiotica e lotta di classe* (Simulation and Falsification. The sign as a value: semiotics and class struggle). The volume discussed re-appropriating new languages as a form of

890 "La società tecnico-burocratica ha visto pericolosamente barcollare le sue catene di mediazione e il suo apparato di consenso." A/traverso, "La Rivoluzione Non è Clandestina," April 7, 1977.
891 "Barefoot" referred to native American Indians.
892 A/traverso. "La Rivoluzione è Finita Abbiamo Vinto," October 1977.

class struggle. The "simulation and falsification" in the book's title were two strategies that could be used for this re-appropriation, alongside traditional sabotage. Notably, the book included one of the first mentions of hacking in Italy.[893] Benini and Torrealta discussed Technological American Party (TAP), which published a clandestine magazine with information on how to hack the phone system. TAP was the acronym used since 1973 by the anarcho-communist Youth International Party Line, also known as the "Yippies."

TAP's story powerfully mobilized the Principle of Hopeful Curiosity against the Black Box Entanglement, because it showed it was possible to find new and clever ways to resist and challenge the power of multinational tech companies. Remember that, for the Italian grassroots left, these were also the years when books like *Kapitale e/o Scienza* appeared, describing computers as dangerous tools for "bio-control," and as a technology strongly tied to the oppression and exploitation of the proletariat.[894] The TAP example clearly suggested otherwise. What is more, their practices not only enabled people to "resist" large telecommunication companies' power, but also take advantage of it. *Simulazione e Falsificazione* reported an interview with a TAP member, discussing common phone-phreaking methods (unauthorized access to telephone systems to make free calls). For example, "Captain Crunch" was a famous pioneer of phone-phreaking: he found a way to make free phone calls by imitating the sound signaling a free line in the phone network. Although Captain Crunch was not a member of TAP, his methods were used by the Yippies. Benini and Torrealta described this, and other examples as "falsification" practices.

By practicing Scientific Curiosity, and not losing their hope in the "socialist use of computers," TAP showed that the "capitalist use of computers" could be countered from the here and now. The principal opponent of TAP was AT&T, the main US phone company (originally known as "American Telephone and Telegraph Company"). Benini and Torrealta pointed out it was expensive for AT&T to keep on fighting the phone-phreakers, even more expensive than just the economic loss resulting from non-paid phone calls. However, "Repression keeps going. It must keep going, because what is at stake—and this is clear to both sides—is not the price of a long-distance phone call, but the collective imaginary and its ability to confront the technological organization. Proving that this is impossible is the task of the multinational, proving that this is possible are TAP practices."[895] And, as of that moment, TAP had scored a victory.

893 Tommaso Tozzi, *Le Radici Dell'Hacktivism in Italia (1969-1989). Dallo Sbarco Sulla Luna Alla Caduta Del Muro Di Berlino.* (Accademia di Belle Arti di Firenze, 2009).

894 Collettivo Controinformazione Scienza Brescia, *Kapitale e/o Scienza* (Calusca Edizioni, 1977).

895 "Ma la repressione va avanti, deve andare avanti, perché quello che è in gioco, e lo sanno ambedue i concorrenti, non è il prezzo di una telefonata interurbana, ma l'immaginario collettivo e le sue possibilitá di scatenarsi anche nei

As we shall see in this chapter's final section, the interest in hacking grew within the grassroots left throughout the 1980s. When computers became increasingly accessible, the tinkering with radio technologies was extended to tinkering with computer technologies, seen as a new means of (political) communication.[896] In this way, the re-politicization of computers was no longer just a discourse about computers, but also involved computer use and design.

confronti dell'organizzazione tecnologica. Dimostrare che questo è impossibile è il compito della multinazionale, dimostrare che questo è attuabile è la pratica del TAP." Alberto Benini and Maurizio Torrealta, *Simulazione e Falsificazione: Il Segno Come Valore, Semiotica e Lotta Di Classe* (Bertani, 1981). 87.

896 Alessandra Renzi, *Hacked Transmissions: Technology and Connective Activism in Italy* (University of Minnesota Press, 2020).

5.2 The anarchist road to computers. Challenging Utopia outside the Black Box Entanglement

For Italian social movements, the 1980s are generally described as a "reflux period," when many retreated from politics. In 1979, a 10-year long trial began against the political organization Workers' Autonomy (Autonomia Operaia), known as "April 7 Trial" (Processo 7 Aprile) named after the day of the first mass arrests.[897] The methods and assumptions guiding April 7 Trial sparked outrage both nationally and internationally. Intellectuals, journalists, and academics were arrested or declared "suspects" using circumstantial or unproven evidence. Many fled to France, where after 1985, they were officially protected against extradition to Italy by the "Mitterand Doctrine." Amnesty International condemned Italy for running the trial, claiming it violated European and international agreements on fair trials.[898] These events fueled a generic disillusionment which stopped many people taking part in politics.

However, the late 1970s to early 1980s were also a period of debates about "Utopia" (and "Dystopia") within Italian libertarian socialism, which brought some optimism for the future. These debates were not meant to create a dichotomy between a utopian and a dystopian vision for society. Rather, they critically addressed both concepts.[899] Works by three authors were fundamental. One was Marie Louise Berneri (1908-1948),[900] an anarchist intellectual and activist, who wrote an influential libertarian critique of utopian literature: *Journey through Utopia.*[901] The second was Ursula K. Le Guin (1929-2018), renowned science-fiction author, famous for combining science-fiction with political and societal issues.[902] A very famous work by Le Guin contains several left-libertarian themes: *The Dispossessed. An Ambiguous Utopia.*[903] Both Le Guin and Berneri mobilized Bloch's Principle of Hope because they criticized the "ambiguous" and "authoritarian"

897 Giulia Pacifici, "Il PCI, Autonomia Operaia e l'emergenza Terrorismo: Il Caso 7 Aprile 1979," *Storicamente* 12 (2017); Steve Wright, *Storming Heaven* (Pluto Press, 2002); Paul Ginsborg, *A History of Contemporary Italy - Society and Politics 1943-1988* (Penguin, 1990). 386-387.

898 "Amnesty International Annual Report 1983" (Amnesty International, January 1983). 262-265 (https://www.amnesty.org/en/documents/pol10/0001/1983/en/, accessed September 20, 2022.).

899 On the historical relationship between anarchism and utopia: Ruth Kinna, "Anarchism and the Politics of Utopia." In *Anarchism and Utopianism*, edited by Ruth Kinna and Laurence Davis. (Manchester University Press, 2009).

900 Italian sources use her original name Maria Luisa, that she changed to Marie Louise while in exile with her family in France and continued to use. See: Carlo De Maria, *Una Famiglia Anarchica: La Vita Dei Berneri Tra Affetti, Impegno Ed Esilio Nell'Europa Del Novecento* (Viella Libreria Editrice, 2020); Carlo De Maria, ed., *Maria Luisa Berneri e l'anarchismo Inglese: Giornata Di Studi, Reggio Emilia, 19 Novembre 2011* (Biblioteca Panizzi, Archivio famiglia Berneri-Aurelio Chessa, 2013).

901 Marie Louise Berneri, *Journey Through Utopia* (Routledge & Kegan Paul, 1950).

902 The bibliography on Le Guin's work is vast. Laurence Davis has produced several works on the relationship between anarchism and utopia in Le Guin's work. See Davis, Laurence, and Peter Stillman, eds. *The New Utopian Politics of Ursula K. Le Guin's the Dispossessed*. Lexington Books, 2005.

903 Ursula K. Le Guin, *The Dispossessed* (Harper & Row, 1974).

features in utopian visions, but also stressed the importance of keeping on trying to build a different kind of society. The third author is George Orwell, with his book *1984*, which at this point should require no further introduction.

In this section, I discuss how the Technopolitical Resonance established between Le Guin, Berneri, Orwell, and the Italian libertarian socialists also fostered a re-politicization of computer debates. First, I focus on the influence of Le Guin's work for the re-politicization of computer debates among libertarian communists. They mobilized the Principles of Hope and Electric Wit against the Black Box Entanglement's macro-politics and against the Italian Communist Party's (alleged) scientific socialism. Then, I move to the social anarchists by focusing on Marie Louise Berneri's legacy. Whereas Berneri mostly mobilized the Principle of Hope, when her work was re-published in 1981, it fostered the mobilization of Scientific Curiosity. Also in this case, the debate addressed the Black Box Entanglement's macro-politics. With the arrival of the Orwellian 1984, social anarchists' computer debates also mobilized the Principle of Hopeful Curiosity. Like the democratic socialists, they realized that "Orwell's prophecy" had not come true. This reinforced the possibility and the need to find a socialist use of machines: whereas Orwell's fears had not materialized, there were other concerns in the year 1984.

5.2.1 From Marxists to Martians. Computers and political science fiction

From 1977, a new magazine appeared in Italy: *Un'Ambigua Utopia*, subtitled "a review of marxian critique," later changed to "a magazine of marx/t/ian critique."[904] Although a short-lived and ultimately niche publication, *Un'Ambigua Utopia* was a milestone in shaping political interest in science fiction among the Italian grassroots left. The re-politicization of science fiction was a step towards the re-politicization of computers. The magazine title was taken from Ursula Le Guin's novel *The Dispossessed: An ambiguous utopia.*[905] The book tells the story of two planets: Urras, divided into a capitalist society and a communist one (ruled in Soviet-style), and Anarres, where society is anarchist. The protagonist is the scientist Shevek, a citizen of Anarres, who realizes that there is an underlying ambiguity in every kind of utopia, even an anarchist one. The founders of the Italian magazine chose this name for three reasons: as a tribute to Le Guin's book; to stress the fact that the utopias presented in science fiction were real; and to underline that some science fiction

904 It changed from the 4th issue. See: Antonio Caronia and Giuliano Spagnul, eds., *Un'Ambigua Utopia. Fantascienza, Ribellione e Radicalità Negli Anni '70*, vol. 1, 2 vols. (Mimesis, 2009).

905 It was published in Italian in 1976. Ursula K. Le Guin, *I Reietti Dell'altro Pianeta. Un'Ambigua Utopia* (Nord, 1976).

authors presented ambiguous political theories under the guise of science fiction. Ursula Le Guin had a positive opinion of the magazine.[906]

The articles published in *Un'Ambigua Utopia* also discussed technological development outside science fiction. In doing so, they often mobilized the Principle of Hopeful Curiosity, by fostering a critical yet open perspective. Furthermore, the magazine's science fiction items (short stories and comic strips) mobilized Electric Wit to discuss political and societal aspects of technological development. At times, this Electric Wit was mobilized against the Italian Communist Party, accused of having abandoned left ideals and encouraging technological determinism.

The launch of *Un'Ambigua Utopia* was prompted by a 1977 debate on politics and science fiction in the popular science fiction magazine *Robot*.[907] It all started with an article by Remo Guerrini, who argued that science fiction should not be seen as a depoliticized literary genre.[908] On the contrary, there were many important political themes in science fiction, to the point that it was possible to establish a difference between "reactionary" and "progressive" science fiction. This became evident in the USA, when, during the Vietnam War, science fiction magazines published two conflicting calls from authors: one supporting the war and one opposing it. Guerrini evidently favored the latter, and was particularly critical of the "reactionary" writers, who at times were also defined as "fascists." But, more than anything, Guerrini was critical of those who denied science fiction's political significance. His critique revealed a certain libertarian sensitivity, in the form of a firm stance against centralized power: "To say 'I am not interested in politics' and therefore '[Science Fiction] should not be interested in politics,' is a very dangerous political act: to delegate. Not being interested in politics means putting your trust in the hands of whoever, in whatever way, is in power."[909] Unsurprisingly, the article generated much debate in *Robot*. Right-wing readers were particularly critical, but others appreciated Guerrini's perspective.[910] So much so that some of them decided to establish an explicitly left-wing Science Fiction magazine, *Un'Ambigua Utopia*.

906 Ursula K. Le Guin, "Caro Giancarlo e Il Collettivo," *Un'Ambigua Utopia*, November/December 1978.

907 "Per Una Storia Di Un'Ambigua Utopia," in *Un'Ambigua Utopia. Fantascienza, Ribellione e Radicalità Negli Anni '70*, vol. 2, 2 vols. (Mimesis, 2009).

908 Remo Guerrini, "Fantascienza e Politica," *Robot – Rivista Di Fantascienza*, March 1977.

909 "Dire 'non mi interesso di politica' e, per traslato, 'la sf non deve interessarsi di politica', è compiere un atto politico gravissimo: la delega. Non interessarsi di politica significa abbandonarsi nelle mani di chi, con qualsivoglia modo, gestisce il potere." Guerrini. 117.

910 See "Contropinioni" where most letters were published. *Robot – Rivista Di Fantascienza*, June 1977. Guerrini's reply: "Lettere," *Robot – Rivista Di Fantascienza*, September 1977.

The magazine's founders, mostly former militants in the Milan Autonomia, shared an interest in science fiction. Their editorial line amplified the Principle of Hopeful Curiosity's Technopolitical Resonance. Their third issue, for example, focused on "Robots." In the introduction, the magazine editors observed how science fiction never depicted robots as the primary tools of capitalist accumulation, unemployment, and factory work automation, contrary to what was happening in real life. Real robots were not rebelling against their makers, nor were they granting humans more free time, as often depicted in science fiction. The editors then reported on the classical Marxist critique of the period, arguing that under a capitalist system, technology would have to be employed in oppressive ways. However, they also specified, "We don't want to promote an anti-technology discourse. The dilemma is not whether we should accept science or not, but how it is used. Therefore, we welcome mechanization, but in the times and ways based on human needs, not production demands."[911] The *Un'Ambigua Utopia* editors thus stressed the possibility of finding a "socialist use of machines," and envisioning human-centered technological development.

Electric Wit was also often mobilized in the magazine to point out the "ambiguities" of a de-politicized technological utopia. The Italian Communist Party was often targeted by this mobilizing emotional practice. For example, the theme in the magazine's fourth issue was "mutation." Articles on the "mutant" in science fiction featured alongside articles on nuclear energy. A short story was published in the form of a fictional letter to the editor. This short story mobilized Electric Wit against the PCI's support of nuclear energy, and against Enrico Berlinguer's calls for "national unity" and his attempts to regain some consensus within the grassroots left. The letter's heading was "I mutanti e la crisi. Una proposta unitaria, democratica e di massa" (The mutants and the crisis. A unitary, democratic, and mass proposal). This heading and the text mocked PCI secretary Enrico Berlinguer's speeches, replicating Berlinguer's typical statements. This fictional Berlinguer suggested that *Un'Ambigua Utopia* editors and readers join his plan to intensify nuclear energy production in Italy. This would create a new social class, the mutants, who could solve all the existing societal problems and political tensions: The mutants could take over the more difficult and unpleasant jobs, and also serve as the new scapegoats for societal anger (replacing, therefore, the Autonomists who currently fulfilled this role).

911 "[…] Il nostro non vuole essere un discorso antitecnologico. Il dilemma non sta nell'accettazione o nel rifiuto della scienza ma, secondo noi, nell'uso che della scienza si fa. Ben venga quindi la meccanizzazione, ma in tempi e modi definiti sulla base delle esigenze umane e non solo su quelle produttive." "In Questo Numero," *Un'Ambigua Utopia*, Summer 1978.

Electric Wit was also mobilized through visual means, for example comics, images, photomontage. The robot-themed issue included a comic strip based on a technologically advanced future where the PCI was Italy's ruler, sustained by the labor unions and the Catholics. This mobilized Electric Wit mocking the Historic Compromise between the PCI and the Christian Democracy, and the labor unions' support. The alliance between these three political actors was evoked through funny names such as "Apostolic Confederation of Labor Unions" (Confederazione Apostolica Sindacale), or phases like: "we invite the believers and comrades to come close to the Institutions and sing together 'Berlinguer Noster'," [912] a reference to the "pater noster" (our Father) prayer.

The comics also mobilized Electric Wit against the PCI's perceived technological determinism, and against the way the PCI called all the members of the grassroots left "extremists" and "violent," even those not involved in violent attacks. "The Robot of Internal Affairs" (as in "the Minister of Internal Affairs") had recruited a group of "Ambiguous" and "Utopian" subversives for a "re-education of the misfits" project. The Robot of Internal Affairs asked that all the subversive activities be "rationalized and planned," in the interest of an alliance with the "burosaurs of Delta Centaury" and "in the interest of the country and the entire cosmos." This was again a clear reference to the Historic Compromise: Delta Centaury was Christian Democracy (whose Italian acronym is 'DC': these two letters featured graphically). The call for unity in the interest of the country and the cosmos was a reference to Enrico Berlinguer's calls for national unity. The Robot of Internal Affairs gave the "ambiguous" and the "utopians" an "extremist's card," which allowed them to print one clandestine publication per month and perform one violent attack per year. Neither the "utopians" nor the "ambiguous" want to attack, but they know the government expects them to do it. While each group tries to convince the other to make a move, an explosion happens, and both are forced to flee because they know that they will get the blame. "Such a hard life that of the extremist! I wonder how much better it was in the 20th century!!" the utopians and the ambiguous observe while flying away in a spaceship.[913]

After the fourth issue, a key figure in the history of Italian political science fiction joined the editorial group: Antonio Caronia, former militant in the Fourth International, and a math teacher by day.[914] Caronia significantly contributed to transforming the project from a well-crafted yet fanzine-

912 "Si invitano I fedeli ed I compagni a stringersi attorno alle istituzioni e ad intonare con me il 'Berlinguer Noster'." Mauro A. Miglieruolo, "I Mutanti e La Crisi. Una Proposta Unitaria, Democratica e Di Massa," *Un'Ambigua Utopia*, Jan/Feb 1979, 29.

913 "Vita dura quella degli estremisti! Chissà come se la passavano meglio nel secolo 20!!" Maurizio, "Gli Ambigui e Gli utopici. Fantafumetto Spaziale Senza Senso," *Un'Ambigua Utopia*, Summer 1978, 31.

914 Caronia and Spagnul, *Un'Ambigua Utopia. Fantascienza, Ribellione e Radicalità Negli Anni '70*. 8.

style publication to an officially registered magazine with institutional distribution channels. He also expanded the group's network, enriching the magazine with more articles by external contributors. For example, the final issue of *Un'Ambigua Utopi*a (1982), brought Paola Manacorda and Franco "Bifo" Berardi (among others) together to discuss the theme "simulation." Their articles addressed two different emotional practices related to the macro-politics of the Black Box Entanglement: the never-ending enthusiasm mobilized by utopian visions of computer society (Manacorda), and the fear and sadness accompanying these utopian visions (Bifo).

Bifo's article had a very different register than the 1970s *A/traverso* writings. He had not lost his amusing and creative writing style but, instead of mobilizing Electric Wit, he put a strong emphasis on how power structures (what Bifo called "dominance") mobilized negative emotions to maintain control over society: "Panic, depression: these are therefore the epidemics that dominance spreads on the contemporary social brain, on the planetary brain. Panic, depression: they are the conditions for the ramification of dominance, the condition for its reproduction in the mutation from the industrial world to the electronic information world."[915] At the same time, Bifo continually imagined the possibility of a socialist use of technology, mobilizing the Principle of Hopeful Curiosity. There was in fact a remedy for contemporary society's panic and depression: a "secession of nomadic colonies," held together by a telematic network of interchange. In order to counter the Black Box Entanglement, it was necessary to acquire technological know-how (create a telematic network), and use it to craft a new, human-centered, technopolitical vision for the future.

The language Paola Manacorda used was less spectacular than Bifo's, but nonetheless effective in amplifying the Technopolitical Resonance of the Principle of Hopeful Curiosity. In her article, "The Big Automata," she critically addressed some popular utopias related to computers, which mobilized enthusiasm towards the Black Box Entanglement's promises.[916] Manacorda mobilized skepticism in these promises and the enthusiasm surrounding them. She analyzed the utopia connected to the "rationality of decisions" myth which emerged from the 1950s. This myth was based on the false belief that society could be made to function under the same principles of "rational management" in business administration. In the 1970s, Manacorda observed, as machines became smaller and more accessible to the public, a new utopia emerged, exemplified by the Japan

915 "Il panico, la depressione, sono dunque l'epidemia che il dominio diffonde sul cervello sociale contemporaneo, sul cervello planetario. Il panico, la depressione, costituiscono la condizione perche` il dominio si ramifichi, e si riproduca nella mutazione dal mondo dell'industria al mondo dell'informatizzazione elettronica." Franco "Bifo" Berardi, "Appunti per l'immunizzazione Contro l'epidemia Depressiva," *Un'Ambigua Utopia*, 1982, 22.

916 Paola Manacorda, "Il Grande Automata," *Un'Ambigua Utopia*, 1982.

Computer Usage Development Institute (JACUDI) report on *The Information Society.*[917] This utopia was still linked to a positivist and centralized vision of technology, although more distributed than others. However, Manacorda pointed out that the "information society" it envisioned was very far from reality, because of the many contradictions fueled by capitalism's increasingly serious crisis.

Manacorda also discussed the Nora/Minc report,[918] which envisioned a more decentralized, diffused version of the information society. This vision could indeed be an alternative to the Black Box Entanglement, because it implied a greater sharing of technological know-how. But Manacorda observed that it was also too much of an idealized vision. In the final part of her essay, she also mobilized skepticism towards the promises of an increased computer technologies decentralization. Manacorda observed how even a decentralized system would always have some elements more decentralized (or more centralized) than others. Therefore, people had to have a certain mistrust in everything technology promised. Ultimately, she concluded, in an undoubtedly Marxist fashion: "perhaps this is the real utopia: to forget that there are different forms of knowledge and of power. That society, although flexible, adjustable, expansible and integrated like a real IBM, is still, and will be for a long time, divided into classes."[919]

Un'Ambigua Utopia thus fostered a re-politicization of computer debates, by re-politicizing science fiction. Discussing the political aspects in science fiction's technological development was also an opportunity to investigate technological development's political significance in real life. And, as computer systems prominently feature in science fiction, this also led to publishing articles about computers. As we shall see in this chapter's final section, politicized science fiction also played a role in the birth of a hacking community in Italy.

5.2.2 Centralized planning? "Depressingly uninspiring." An anarchist journey through the ambiguity of utopia

Whereas Le Guin's book *The Dispossessed: An ambiguous Utopia* discussed utopia through science fiction, Berneri's *Journey Through Utopia* was an anthology essay on utopian literature seen from

917 Japan Computer Usage Development Institute. Computerization Committee, *The Plan for Information Society: A National Goal Toward Year 2000* (1972); *Verso Una Società Dell'Informazione. Il Caso Giapponese* (Edizioni di Comunità, 1974).

918 Simon Nora and Alain Minc. *L'informatisation de La Société: Rapport à M. Le Président de La République* (La Documentation française, 1978).

919 "La vera utopia è forse questa: scordarsi che esistono poteri e saperi differenti, che la societá, ancorché flessibile, modulare, espandibile e integrata come un vero IBM, è sempre, e ancora per molto, divisa in classi." Paola Manacorda, "Il Grande Automata," *Un'Ambigua Utopia*, 1982, 15.

an anarchist perspective.[920] Criticism of utopia was not new when the book was first published in 1950. However, the quality of Berneri's essay made it a referenced work on the subject.[921] The book provided harsh critique of most existing utopian literature. But this was coupled with a call not to abandon the political significance of utopian thinking. As Lewis Mumford noted, "Those who retain a healthy hope for the future will find sustenance for their faith in this book."[922] I argue that Berneri mobilized the Principle of Hope in her book. This in turn eventually countered the Black Box Entanglement's Technopolitical Resonance, because her work influenced crucial historical actors who contributed to the re-politicization of computer debates within Italian anarchism. Carlo Doglio described the book as highly influential in his intellectual development.[923]

Journey Through Utopia had a tormented editorial history in Italy. Originally written in English, it was first published in 1950. Through Doglio's input, the Olivetti publisher Edizioni di Comunitá signed a contract with book publishers Routledge and Kegan Paul, to issue the book's Italian translation in the late 1950s. However, the project never materialized, and Edizioni di Comunitá retained the rights for *Journey Through Utopia*'s Italian translation until 1971, thus preventing other Italian editors from publishing it for more than a decade.[924] While the book's international circulation was growing, Italian anarchists gradually forgot about it, as evidenced by the lack of references to Berneri and her writings in 1960s and 1970s anarchist publications. The first *Journey Through Utopia* Italian translation was only published in 1981 by the Italian anarchist movement. The book's English version had attracted some attention in Italy, both in the anarchist movement and politicized intellectual circles.[925]

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920 Ugo Fedeli organized a course for Olivetti workers "Un viaggio alle isole di Utopia" ("A journey to the islands of Utopia"), a historical overview of main utopian societies imagined in the past, from Plato to William Morris. See: Antonio Senta, *L'Altra Rivoluzione. Tre Percorsi Di Storia Dell'anarchismo* (BraDypUS, 2016).

921 As the book was published posthumously, the Freedom Press community did the final editing and international promotion. It was translated into German, Spanish, Greek, Japanese, Arabic, and Italian. More English-language editions followed.

922 Lewis Mumford wrote a glowing review: "As an old student of utopias, I have a special regard for Marie Louise Berneri's Journey through Utopia; for it is the most comprehensive and the most perceptive study of that ideal land that I have come across in any language." Review of *Journey Through Utopia*, Marie Louise Berneri, *Anarchy*, October 1961.

923 Carlo Doglio, "L'equivoco Della Città Giardino Trent'anni Dopo. Una Lezione Di Carlo Doglio," *Contesti. Città, Territori, Progetti*, no. 1 (2018): 228–43. This is a transcript of a Doglio lesson at the University of Florence in 1987. Doglio was a friend of Berneri's husband, Vernon Richards, who he frequently saw in London and he also met Berneri.

924 The book was proposed for publication by Doglio in 1959, but awaited Adriano Olivetti's approval for many months. The last communications between Doglio and Zorzi (head of Edizioni di Comunitá) I found are from July 1960, after Adriano's death. It is not clear what happened afterwards. Possibly publication of *Journey Through Utopia's* was shut down, and Doglio therefore did not mention it. See: Carlo Doglio, "Corrispondenza," Archivio Biblioteca Libertaria Armando Borghi.

925 The Feltrinelli library, the Einaudi Institute, and the Olivetti library have copies of the book's first English edition.

Berneri reviewed a wide range of utopian literature in her book, from Plato's *Republic* to early 20th century anti-utopias such as Huxley's *Brave New World*, concluding that any utopia which did not allow space for human agency should not be considered interesting from an anarchist standpoint. This included most utopias. Berneri's perspective was based on the classical anarchist anti-authoritarian critique, coupled with her personal experience of the terrible consequences of both fascism and Soviet authoritarianism.[926] "*Animal Farm* by George Orwell (1945), could only be considered a satirical utopia by those who have not followed Russian history during the past thirty years,"[927] she observed. However, Berneri also stressed utopian thinking's positive role. At the end of the book, she observed that "Utopias have often been plans of societies functioning mechanically, dead structures conceived by economists, politicians, and moralists; but they have also been the living dreams of poets."[928] Thus, Berneri mobilized the Principle of Hope, by stressing that utopian thinking should not be removed from political thinking. But utopias had to foster the free expression of human agency instead of aiming to control it. Berneri was stressing what Bloch called Utopia's "nonguaranteed character," and combining "militant optimism" with "thinking *ad pessimum.*"

Berneri did not specifically mobilize Scientific Curiosity. But she endorsed neither excessive optimism nor pessimism in science and technology's societal and political significance. She noted a shift happening in her own time, from a period marked by "the faith in the machine as an agent of human happiness," to "a distrust and even fear of the machine."[929] Berneri was certainly critical of excessive faith in machines, as shown by her critique of scientific socialism. One of the authors discussed was Henri de Saint-Simon. Berneri observed how most socialists pretended to despise him, yet his ideas on experts and technicians' primary role in state administration were shared by many, and described quite well the Soviet Union context. Although Berneri did not use the term, we can interpret her perspective on the Saint-Simonian utopia as typically anarchist criticism of "techno-bureaucracy," as she was certainly exposed to the topic through her father's writings.[930] As an anarchist, Berneri was clearly critical of 19th century State-based utopias, including most socialist utopias, which in her view were "depressingly uninspiring": "they aim at setting up a vast machinery which will ensure a perfect running of society and bring material well-being to everyone. But in these intricate mechanisms man's individuality is completely lost."[931]

926 The family exiled to France to escape fascist persecution. In 1936, Camillo Berneri (Marie Louise's father) was murdered in Spain during the Civil War, by Stalinist troops.
927 Berneri, *Journey Through Utopia*. 313.
928 Berneri. 317.
929 Berneri. 311.
930 Marie Louise Berneri had a close relationship with Camillo Berneri and was curating an edition of his work until she died. See: De Maria, *Una Famiglia Anarchica*.
931 Berneri. 216.

Berneri did not elaborate on her views regarding "distrust and fear" of machines, but her perspective on scientific socialism was certainly informed by a critical vision of the role of scientific knowledge and scientists at the time. In discussing Francis Bacon's Utopia *New Atlantis*, which gave scientists absolute trust (and power), Berneri observed that, in her day: "We are also in a better position to appreciate the dangers of 'science without conscience.' The thought that harnessing atomic energy may spell the end of our civilization has deprived science of its glamorous halo. The scientist is no longer considered a benefactor of humanity, but unwillingly assumes a sinister role and is sometimes overcome by feelings of guilt." However, Berneri's work has been placed within the tradition of Malatestian anarchism,[932] and in this sense there is no reason to categorize her as a proponent of "anti-technology" attitudes. Berneri criticized her contemporaries' gloomy anti-utopian satire against highly technological societies, for example Zamatyn and Huxley, who criticized Soviet and US high-tech society. Berneri evidenced that both authors stressed it was impossible to express "negative" emotions in these societies, where a continuous state of happiness was enforced upon citizens. Berneri felt that Zamatyn and Huxley focused on people's "right to suffer," instead of their right to find happiness through expressing their unique personality. "These writers criticize Utopia because there is no room for Hamlet or Othello, forgetting that in between Hamlet and a robot-like man, there is room for an individual who has neither Hamlet's neurotic temperament nor is a robot."[933]

In the 1980s, Italian anarchists re-discovered Berneri's work. It was recognized within the Italian anarchist canon, and her mobilizing emotional practices became part of a regulating emotional practice amplifying the Principle of Hope. In September 1981, the Centro Studi Libertari organized an international conference on "Utopia." The Italian edition of *Journey Through Utopia* was published after the conference, but its 1962 Spanish edition had found its way into the conference debates.[934] Amedeo Bertolo, a GAF founding member, wrote a long essay about the significance of "Utopia" within the socialist, and particularly anarchist, political tradition. Bertolo explicitly mentioned Bloch when discussing the different functions of Utopia. Bloch's Principle of Hope had not yet been translated into Italian, and Bertolo did not refer to it in his article. But, I argue, Bertolo did amplify the Principle of Hope, confirmed by his several references to the centrality of "hope" and "will" (the two key components of Bloch's Principle of Hope) in making an anarchist utopia.

932 Federico Ferretti, "Journeying through Utopia: Anarchism, Geographical Imagination and Performative Futures in Marie-Louise Berneri's Works," *Investigaciones Geográficas*, no. 100 (2019).
933 Berneri, *Journey Through Utopia*. 317.
934 Maria Luisa Berneri, *Viajes a Través de Utopia* (Proyeccion, 1962).

Bertolo also performed a regulating emotional practice, which amplified the Principle of Hope, and thereby referenced Berneri's work. This emotional practice was based on criticism of technocracy:[935] "What we strongly object to here is not utopian planning in general, but the pretense, which is irremediably anti-anarchist, of imposing from the top any global plans for the present and the future." First, Bertolo showed why the emotions mobilized by such top-down utopian plans were not desirable: "It is the horrible technocratic dream by many aspiring social engineers, who want to constrict reality in the straitjacket of their rationality. It is the 'happiness' which is prepackaged for the people by 'enlightened princes' (or 'revolutionary' dictatorships), the 'happiness' built upon their authors' idea of happiness." Then, Bertolo highlighted the desirable emotions mobilized by left-libertarian utopias: "Anti-authoritarian utopias, on the contrary, as observed by Maria Luisa Berneri, 'did not try to present a pre-made plan, but audacious and heterodox ideas, (…) they stated that each man was 'unique' and not one among many,' they suggested 'an ideal for life without making a plan for it, which is a dead machine applied to living matter."[936] Therefore, on the one hand, there was the "horrible" technocratic happiness, imposed through top-down planning. On the other hand, there was the "audacious" anti-authoritarian happiness, achievable by enabling individuals to perform their agency.

Six months after *Journey Through Utopia's* Italian translation was finally published, in March 1982, *A-Rivista* presented a review of the book by Maria Teresa Romiti, a member of the magazine's editorial collective. Romiti expressed a very favorable view of the book, which she considered a fundamental piece for anarchist thought. Anarchist theory, she noted, had highly overlooked the political significance of "utopia" in previous decades. Following on from Berneri's reflections, Romiti argued that "only if we ask for the possibility of change, of uncertainty, only if we ask for the right to diversity—which is ultimately the right to freedom—only then does utopia become a dream, the project for a tomorrow in a free society."[937] Years later, Romiti referred again to Berneri,

935 Bertolo, "Utopia - L'immaginario Sovversivo," A-Rivista Anarchica, June/July 1981. Berneri's book was also quoted in: Eduardo Colombo, "L'Utopia Contro l'escatologia," *Volontà*, 1981; Kingsley Widmer, "Anarchia, Fantascienza, Utopia," *Volontà*, 1984.

936 "Ma ciò che qui viene negato con forza non è la progettualità utopica in genere, è la pretesa, irrimediabilmente anti-anarchica, di imporre dall'alto piani globali al presente e al futuro, è l'orribile sogno tecnocratico di tanti aspiranti ingegneri sociali di costringere la realtà nella camicia di forza della loro razionalità, è la "felicità" preconfezionata per il popolo da "principi illuminati" (o da dittature "rivoluzionarie"), la "felicità" delle utopie autoritarie costruite sull'idea che di felicità hanno i loro autori. Le utopie anti-autoritarie al contrario, come osserva Maria Luisa Berneri, "non cercavano di presentare un piano prefabbricato, bensì idee audaci ed eterodosse, (...) esigevano che ogni uomo fosse 'unico' e non uno tra i tanti", proponevano "un ideale di vita senza farne un piano - cioè una macchina morta applicata alla materia vivente." Bertolo, "Utopia - L'immaginario Sovversivo."

937 "È solo se si postula la possibilità del cambiamento, l'incertezza, se si postula il diritto alla diversità, in definitiva il diritto alla libertà che l'utopia è il sogno, il progetto del domani di una società nella libertà." Maria Teresa Romiti, "Letture. Viaggio Attraverso Utopia," *A-Rivista Anarchica*, March 1982.

and also to Ursula Le Guin, in an article calling for the revival of Utopian thinking within anarchism, as Berneri had also done in her book (and performing like her a mobilizing emotional practice based on the Principle of Hope).[938]

Maria Teresa Romiti was also interested in technological development, and she prompted debates on computers in *A-Rivista*. Besides Berneri and Le Guin, she had also read Bookchin, and was familiar with his notion of liberating technologies.[939] Her perspective on computers, as we shall see, often underlined their negative implications. But it was not an anti-technology position. Conversely, the questions she asked centered on if and how it was possible to find a "credible" use for computers within a libertarian society.

5.2.3 The computer as a totem. Anarchy, technology and anthropology

In the same *A-Rivista* issue as her review of Marie Louise Berneri's book, Romiti wrote an article on computers, "Totem Computer."[940] This article fostered a re-politicization of computer debates in *A-Rivista*, that had earlier only marginally addressed this theme. The notion of a "right to diversity," evidenced by Romiti in her review of *Journey Through Utopia*, became a major issue in her reasoning around computers. In this sense, she mobilized the Principle of Hopeful Curiosity because the notion of "right to diversity" stressed the centrality of human agency for creating a libertarian society (Principle of Hope). Furthermore, the quest for this "right to diversity" also mobilized Scientific Curiosity, because it called for the inclusion of several different knowledge systems into the conversation. This first computer debate and the next one in *A-Rivista* thus introduced a new category of analysis in Italian socialists' computer debates: culture, in an anthropological sense. The mobilizing emotional practices discussed in earlier chapters came under categories such as "class," "gender," and "political ideology" in general. Labor unionists criticized the Black Box Entanglement's promises because they did not account for the agency of the working class, while socialist women stressed how they, as women, were excluded from these promises. The anarchists certainly shared these observations, and added a new one: computer promises and models were ethnocentric.

938 Maria Teresa Romiti, "Letture. Viaggio Attraverso Utopia," *A-Rivista Anarchica*, March 1982.
939 Maria Teresa Romiti, "Ecologia Sociale," *A-Rivista Anarchica*, June/July 1981.
940 Maria Teresa Romiti, "Totem Computer," *A-Rivista Anarchica*, March 1982.

Alongside the works by Bookchin, Berneri and Le Guin, another influence on anarchists' computer debates came from anthropology literature. This interest was fueled by the An.Archos group.[941] The *An.archos* magazine's first issue contained a translation of work by French ethnographer Pierre Clastres, mostly known for his "stateless societies" themes.[942] And in 1981, An.Archos members Piero Flecchia and Roberto Marchionatti organized a conference on Clastres, which Romiti attended.[943] From a technology perspective, the work by Clastres had a close connection with Bookchin. Both stressed the co-existence of different technologies, and different technological necessities, thereby rejecting the idea of a linear and all-beneficial technological development. Once again, the Fear of Falling Behind was meaningless. Not only because the anarchists had no desire to join a capitalist society, but also because, as pointed out by Marchionatti, "Clastres confutes from a logical perspective the definition of 'underdeveloped technique' because it is not possible to establish a hierarchy among techniques: technique can only be envisioned in relation to the need it satisfies."[944]

Romiti presented a perspective similar to Paola Manacorda's, mobilizing skepticism in Black Box Entanglement's promises by pointing at the myth surrounding computer discourses. However, Romiti specified, "I absolutely do not agree with defining the computer as a Capital's tool, as part of Marxist critique argues. Computers are not Capital's tools. To confute this theory, we only have to look at the development and studies of 'communist' countries: the computer is techno-bureaucracy's tool."[945] The criticism of computers as techno-bureaucracy's tools did not imply a rejection of techno-scientific knowledge. Romiti showed that also technology experts recognized there were limits to the power of the "totem computer." On computer languages' societal and political implications, Romiti quoted an article by computer sciences professor Luigi Dadda, who stressed that computer languages influenced the way people thought about problems, and how to solve them. Romiti was thus mobilizing Scientific Curiosity because she related her doubts to those of the scientific community. Her article did not make a definitive judgment, but questioned the role of computers in contemporary societies: first, whether it was possible to imagine a libertarian use of

941 Bertolo also used anthropology in his speech on Utopia to illustrate multiple societal organization forms in history. Bertolo, "Utopia - L'immaginario Sovversivo," *A-Rivista Anarchica*, June 1981.

942 Pierre Clastres, *Society against the State: Essays in Political Anthropology* (Princeton University Press, 2020).

943 See: An.Archos 1, 1979; Pietro Flecchia, Roberto Marchionatti, and Maria Teresa Romiti, "Antropologia e Società," *A-Rivista Anarchica*, May 1981.

944 "Clastres confuta dal punto di vista logico la definizione di tecnica sottosviluppata perché non è possibile fare una gerarchia delle tecniche: la tecnica può essere vista solo in relazione al soddisfacimento dei propri bisogni." Flecchia, Marchionatti, and Romiti.

945 "Per questo non sono affatto d'accordo nel definire il calcolatore lo strumento del capitale, come invece sostiene parte della critica marxista; il calcolatore non è lo strumento del capitale. Basterebbe già a confutare questa teoria lo sviluppo e lo studio che esiste nei paesi "comunisti": il calcolatore è lo strumento della tecnoburocrazia." Maria Teresa Romiti, "Totem Computer," *A-Rivista Anarchica*, March 1982.

this technology. Second, whether it was still possible to imagine a society that did not use computers. The article ended with a reference to computers' ambiguity in Le Guin's *The Dispossessed*, which showed how there was always some risk with this technology, as it was originally designed to centralize power.

The next *A-Rivista* issue published a letter by Gilbè, from Carrara's Cooperativa Tipolitografica, an important anarchist typography, where the Italian edition of *Journey Through Utopia* had been printed. Gilbè strongly disagreed with Romiti. He interpreted her perspective as fearful, declaring that such perspectives scared him. He argued that technology was neither good nor bad, of course with some exceptions such as nuclear energy, which was always bad. Thanks to computers, with his typography he could do the work of three people. If it wasn't for the computer, he could not possibly have continued his work. According to Gilbè, the contemporary anarchist movement's task was "to take control of the means of production in order to 1) eliminate all the parasites; 2) produce useful goods; 3) give everyone work in such production; 4) give everyone the opportunity to live well thanks to this work."[946] In this way, Gilbè mobilized enthusiasm for computers, and also Scientific Curiosity. But this perspective seems closer to scientific socialism than to Malatesta's Hopeful Curiosity, as Gilbè suggested that changing production relations would lead to a libertarian society. The centrality of human agency was lost in the argument.

The debate continued in the following *A-Rivista* issue, with an article by Piero Flecchia "There is no neutrality in technique."[947] Flecchia addressed Gilbè's article, clarifying that he was "100 percent in favor of computers" (thereby mobilizing Scientific Curiosity). However, Flecchia argued, technology should never be considered a neutral endeavor because technological choices were always guided by political ones. "In the dream, which is not only Marxian, the citizen becomes the new Prince and the machine becomes the slave. But the limits of this dream, the computer illusion, are evident today."[948] While Gilbè had stressed the computer's advantages in the workplace, Flecchia observed that the true contemporary battleground was not related to working time, but free time. That was the time when political decisions were made.

946 "[…] Di prendere in mano la proprietà dei mezzi di produzione per avere la possibilità di: 1) eliminare tutti i parassiti; 2) produrre merce utile; 3) dare lavoro a tutti per tale produzione; 4) dare a tutti la possibilità di vivere bene grazie a questo lavoro." Gilbè, "Ben Venga Il Computer," *A-Rivista Anarchica*, April 1982.

947 Flecchia, Pietro, "Non Esiste Una Neutralità Della Tecnica," *A-Rivista Anarchica*, June/July 1982.

948 "Nel sogno non solo marxiano il cittadino diventa il nuovo principe e la macchina lo schiavo, ma i limiti di questo sogno: l'illusione informatica, sono oggi evidenti." Flecchia.

The debate ended after Flecchia's article, until May 1984, when *A-Rivista* published an entire thematic issue on "Computer and Dominance." A remarkable feature of this special issue is that all the contributors except one were women. This configuration was exceptional because, even in libertarian and socialist circles, computer debates were mostly men's business.[949] This special issue reinforced the libertarian criticism of the Black Box Entanglement. Most articles questioned the fact that computers, whether used in a capitalist, communist, or libertarian society, were the best available technology to perform certain tasks. By questioning the computer's ability to correctly interpret and analyze society, the authors mobilized skepticism in Black Box Entanglement's macro-politics. They also stressed the importance of understanding technology's function, mobilizing Scientific Curiosity to counter Black Box Entanglement's micro-politics.

Maria Teresa Romiti authored two articles. The first article, "Neither mythicize nor demonize," presented a similar perspective of "Totem Computer." Romiti mobilized Scientific Curiosity about computer functioning, observing that "the biggest problem today is understanding what kind of machine is the computer, what weird animal are we looking at. […] Is it a libertarian technology or not?"[950] Besides understanding the machine, it was also important to understand whether people who did not want to use computers had a right to do so (that is, again, the "right to diversity"). This was a key issue in that historical moment, Romiti observed, because this right was increasingly denied by society. Her second article expanded the concept of a "right to diversity." In it, she mobilized skepticism and mistrust in Black Box Entanglement's promises. This mobilizing emotional practice was informed by the "anthropological turn" in anarchist computer debates. She observed that the idea of a "neutral technology" was ultimately an ethnocentric one, and often coupled with teleological and deterministic narratives of humanity's development from simple to complex societies. In these narratives there was no space for different knowledge systems to coexist: this was the main problem with computers. In contemporary computer logic, "The world is substituted with a model, a theory which might also be working, but that in any case always excludes something that is part of humanity."[951] Romiti was not against computers, as long as those

949 In those years the collective managing *A-Rivista* was mostly composed of women, an exceptional fact in the anarchist movement and grassroots left in general (outside feminist collectives). See "Trentasette Anni Fa," *A-Rivista Anarchica*, March 2020.

950 "Il problema più importante oggi è quello di arrivare a comprendere che tipo di macchina sia il computer, quale strano animale abbiamo di fronte. […] Si tratta di una tecnologia libertaria o no?" Maria Teresa Romiti, "Né Mitizzare Né Demonizzare," *A-Rivista Anarchica*, May 1984.

951 "Al posto del mondo si sostituisce il modello, una teoria che potrà anche funzionare, ma che in ogni caso esclude sempre qualcosa che pure fa parte dell'essere umano." Maria Teresa Romiti, "Lo Scalpello Di Zelindo," *A-Rivista Anarchica*, May 1984.

who did not want to use them were not forced to do so and could continue fostering other knowledge systems.

The non-neutrality of technology observed by Flecchia in 1982, and now by Romiti, might seem to contradict Malatesta (who had explicitly stated that science and technology should in principle be considered "neutral"). However, I claim that their position represented a further update of the Malatestian perspective. Flecchia's and Romiti's aim was undoubtedly Malatestian: contrasting deterministic perspectives on scientific and technological development, and re-affirming the centrality of the individual as a political subject, and of individual agency (that is, the Malatestian "will") as a fundamental force for political and societal change.

The importance of a "right to diversity" was also stressed in Fausta Bizzozzero's article, "Enemy technology."[952] Her perspective was more negative than Romiti's, as Bizzozzero openly declared she did not like technology. She was open to using it if necessary, as everyone inevitably did, but was not particularly enthusiastic. Was that going to be possible in the future? she wondered. Bizzozzero also observed that the increasing reliance on computers was causing a loss of knowledge. She mobilized concern about existing knowledge systems being "brutally and inexorably replaced by the culture of specialization,"[953] symbolized by advanced technologies. But her concern also mobilized Scientific Curiosity, in the sense that she wanted this knowledge revived. That is, for both Bizzozzero and Romiti, the call for a "right to diversity" was also a call for increasing scientific knowledge by including different knowledge systems.

On the other hand, an article by Gianluigi Bogani, "Comrade Computer Science," was much more optimistic. He openly mobilized skepticism in Romiti's and Bizzozzero's perspectives, and all those who asked, "is it really impossible to avoid [the computer]?"[954] He invited readers to remember Kropotkin's work on progress as the "natural" carrier of anarchist communism (a vision which Malatesta opposed, as we have seen). Bogani was of course critical about the "capitalist use of computers" in his piece, but observed how the lack of interest in techno-scientific knowledge negatively impacted the anarchist movement. Bogani argued that it was contradictory to pursue a new society with primitive technological means. Anarchism had to urgently include technology in its project to create a new culture.

952 Fausta Bizzozzero, "Tecnologia Nemica," *A-Rivista Anarchica*, May 1984.
953 "Brutalmente ed inesorabilmente soppiantata dalla cultura della specializzazione." Bizzozzero.
954 Gianluigi Bugani, "Compagna Informatica," *A-Rivista Anarchica*, May 1984.

The final essay was by Loredana, who worked in a microcomputer factory sales department and could therefore provide crucial insights on how the actual computer market worked. In the article "An ambiguous fascination," (most likely a reference to Le Guin), she mobilized concerns over the Black Box Entanglement's micro-politics. Loredana reported that most customers bought "beautiful" terminals which they had no idea how to use. In this way, customers were completely dependent on the company's software experts. This was a crucial feature of computers, Loredana observed: knowledge about them was very scarce. Computers were sold as black boxes. She pointed out, "I think we should debunk the idea of an incoming robotized future, which is much more distant than many believe, given our real ignorance on the matter."[955] This argument powerfully mobilized Scientific Curiosity, countering both the excessive pessimism in "anti-technology" attitudes and the excessive optimism in the Black Box Entanglement.

Loredana also stressed how the impossibility to adapt computers to her own needs, worsened her feelings toward the technology. At first, she was actually fascinated by computers, but this feeling changed when she was forced to use them for her job. In the workplace, computers were sometimes more a hindrance than a help, as they constrained what kind of activity she could perform, and the way she had to perform it. The experience Loredana reported was very similar to those at the 1982 conference "Produrre e Riprodurre" discussed in section 4.3.2. The common ground was the fact that these women initially approached computers with scientific curiosity and even enthusiasm. However, these feelings eventually changed to indifference and even annoyance, when the Black Box Entanglement's micro-politics prevented them from increasing their knowledge of the machines, and from personalizing them for their needs.

Although this special issue's theme was "computers and dominance," the kind of "dominance" that generated the most evident concern was not linked to computers' repressive potential, a subject that would be an obvious choice for anarchists. On the contrary, it was the dominance established by a specific way of imagining the world, such as the one the Black Box Entanglement fostered. The most concerning aspect was losing other forms of technological and scientific knowledge. This concern was further mobilized in the special issue's final article. It was a short science fiction story, written by Tiziana Ferrero.[956] "If in 2012..." described a world split in two: on the one hand, an extremely advanced computerized society inhabited by those taking part in the "Technological Revolution"; on the other hand, the ghetto where those who refused to be part of such a revolution

955 "A mio avviso è da sfatare il mito di un vicinissimo futuro robotizzato, che io vedo più lontano di quanto si creda, vista l'ignoranza reale in materia." Loredana, "Un Fascino Ambiguo," *A-Rivista Anarchica*, May 1984.
956 Tiziana Ferrero, "Se Nel 2012...," *A-Rivista Anarchica*, May 1984.

lived. The story included tributes to Le Guin, such as the setting in "Tau Ceti," the same star as in *The Dispossessed*, and a name-giving computer, similar to the one in Anarres (Le Guin's fictional planet). A fundamental ambiguity in the Technological Revolution described by Ferrero was once again the loss of knowledge it caused: "I make textile drawings, but I do not know how to draw," the story's protagonist worried.

5.2.4 "In Big Brother's Face!" The anarchist 1984

The *A-Rivista* special issue on computers and dominance was published in a very symbolic year: 1984, the year of "Orwell's prophecy," as *l'Unità* had called it. For both the PCI, and for the anarchists, the Orwellian year was marked by hope rather than fear. The Italian anarchists, moreover, had a special relationship with George Orwell. First, because like all the other anarchists, they were very familiar with the political themes in Orwell's book. Orwell was a libertarian socialist and shared much of the anarchist critique of Soviet communism.[957] The international anarchist movement had been critical of the Soviet Union since long before Stalin took power.[958] Second, George Orwell also had personal ties with Italian anarchists,[959] based on his connection with the Berneri family.[960] So Italian anarchists knew George Orwell's work very well, and discussed it for several years. For the year 1984, the Italian anarchists did not just organize a special issue or an edited volume: they planned an international anarchist festival.

In 1984, Pinelli Center for Libertarian Studies, together with Canadian research center Anarchos Institute, organized an international conference "Tendenze autoritarie e tensioni libertarie nelle societá contemporanee" (Authoritarian trends and libertarian tensions in contemporary societies) in Venice. The event was a seminar-style meeting in a convivial atmosphere. There was no gloomy discussion on Orwell's worst nightmares, but it was an opportunity to share positive experiences and hopes for the future. The meeting was, according to the organizers, "promoted with voluntary

957 David Goodway, *Anarchist Seeds beneath the Snow: Left-Libertarian Thought and British Writers from William Morris to Colin Ward* (PM Press, 2011).

958 See Emma Goldman's *My disillusionment in Russia* (Doubleday, Page & Company, 1923), and its sequel *My further disillusionment in Russia* (1924).

959 Goodway, *Anarchist Seeds beneath the Snow*. Berneri's book was published at the same time as Orwell's 1984. George Woodcock observed in *Journey Through Utopia* preface that "1984" perfectly represented the maximum expression of an authoritarian utopia, a sort of worst-case scenario rooted directly in Plato's Republic. Berneri, *Journey Through Utopia*.

960 Orwell was a friend of Vernon Richards, Marie Louise Berneri's husband. Berneri's father, Camillo, was a renowned pre-WWII Italian anarchist intellectual, who died during the Spanish civil war (where Orwell also fought). Giovanna Caleffi, Marie Louise's mother, was a crucial figure in post-WWII Italian anarchism: she founded *Volontà* and curated the first Italian posthumous edition of collected works by Malatesta. De Maria, *Una Famiglia Anarchica*; Goodway, *Anarchist Seeds beneath the Snow*.

irony precisely in the year of the Orwellian anti-utopia."[961] Symbolizing this voluntary irony, one of the slogans advertising the conference was "alla faccia del Grande Fratello" (In Big Brother's Face).[962] The slogan mobilized Electric Wit, as it aimed to show that 1984 was not, after all, the 1984 that Orwell had imagined.

The re-politicization of computer debates which started in the first half of the 1980s continued during the debates at the 1984 anarchist festival. The magazine *Volontà* dedicated articles relating to Orwell's book all year, also in preparation for the Venice conference. For *Volontà's* second issue in 1984, Maria Teresa Romiti wrote an article "Is Big Brother made of silicon?"[963] She observed that Orwell's book was not really about computers, but rather about dominance: technology was only instrumental in achieving and maintaining that dominance. That is to say, Big Brother society was not the result of inherent features of technology, but of human choices on how to design and use that technology. Romiti mobilized mobilized deep skepticism about the Black Box Entanglement's promises, by pointing out that the computer's power was at times magnified, beyond its actual potential. She observed that in contemporary societies, computers were presented as "the black box which is used to calculate, elaborate, ordinate at unimaginable speed for man."[964] But behind this enthusiastic presentation, Romiti noted, computers were actually quite stupid machines: this was not evident enough to many users. Furthermore, she observed how many people bought computers because of publicity and fashion, but it was no longer right to associate computers' popularity with some form of "occult persuasion":[965] there was something more to it, evidenced by young people's interest in this machine.

Romiti also discussed computer users' emotional experiences, mobilizing concerns about excessive computer use. She quoted the famous work by Joseph Weizenbaum,[966] one of the first to (benevolently) pathologize hackers, and also Sherry Turkle's work.[967] Romiti used the Weizenbaum and Turkle examples to show how programmers could create a mutually dependent relationship with computers, based on the idea that with computers they could be like God. This also fostered the idea that computers could be as smart (or even smarter) than humans, that the logic of

961 "Promosso con volontaria ironia proprio nell'anno dell'anti-utopia orwelliana." "Venezia 1984. Programma Della Conferenza," Centro studi libertari - Archivio Giuseppe Pinelli, https://centrostudilibertari.it/it/ven84-programma, accessed September 20, 2022.
962 Seen in *Volontà*, 1984, n. 1.
963 Maria Teresa Romiti, "Il Grande Fratello è Di Silicio?" *Volontà*, 1984.
964 Romiti. 65.
965 The "occult persuasion" was a reference to Vance Packard's book *The Hidden Persuaders* (see chap 3)
966 Joseph Weizenbaum, *Computer Power and Human Reason* (W. H. Freeman and Company, 1976).
967 The article mentions "Sherry Twickle," but it was most likely Sherry Turkle.

computers could perfectly explain the world, even better than humans could. However, Romiti also mobilized Scientific Curiosity to counter these claims, observing that "man is not just rationality, but much more. And trying to reduce it to this sole feature, trying to build an entire society around it is ultimately the most irrational expectation, because it is based on unrealistic data, from the fiction that man is only his logic. Or better, only the logic/rationality developed in Western societies."[968] Privileging one form of knowledge over all others, was certainly not a "scientific" endeavor.

During the 1984 Venice meeting, computers were mentioned on different occasions. Concerns about the misuse of computers were voiced but, overall, the Principle of Hopeful Curiosity's Technopolitical Resonance prevailed. Murray Bookchin was no longer the main proponent of a libertarian appropriation of technology.[969] In fact, he mobilized concerns over contemporary technological development, and declared he was naive in celebrating technology's liberating power in the past. Bookchin observed that the book *1984* could have been even darker, had Orwell imagined the possibilities offered by contemporary technological development in terms of societal control. Furthermore, he stressed that the change in the job market, and particularly job losses due to automation, would be tragic. But these observations did not imply that Bookchin had become anti-technology. In the following years, he became a staunch critic of anti-technology stances within the anarchist movement.[970] Furthermore, the pessimistic emotions he mobilized in the rest of the speech became the catalyst for a final mobilizing emotional practice centered on the Principle of Hopeful Curiosity: contemporary era's concerns made anarchism even more necessary today, Bookchin concluded in his essay.

Mario Borillo[971] proposed a more unequivocally positive perspective on computers in his speech "Toward a computerized 1984."[972] Borillo analyzed the relationship between "technological vulnerability" and "societal vulnerability." By comparing these concepts, Borillo mobilized skepticism in the Black Box Entanglement's promises. Borrillo mobilized the Principle of Hope by stressing the centrality of human agency in technological development, thereby challenging the deterministic perspective offered by the Black Box Entanglement's macro-politics. He provided

968 "Ma l'uomo non è solo razionalità, è molto di piú e cercare di ridurlo a quest'unica valenza, cercare di costruirvi un'intera società è in fondo la piú irrazionale delle aspettative perché parte da dati non reali, dalla finzione che l'uomo sia solo la sua logica, anzi solo la logica/razionale che si è sviluppata nella societá occidentale." Romiti, "Il Grande Fratello è Di Silicio?" 71.

969 Murray Bookchin, "L'anarchismo: 1984 Ed Oltre," *Volontà*, 1984.

970 See: Murray Bookchin, *Re-Enchanting Humanity: A Defense of the Human Spirit against Antihumanism, Misanthropy, Mysticism, and Primitivism* (Cassell, 1995).

971 Head of the language and IT system lab at the university of Toulouse.

972 Mario Borrillo, "Verso Un '1984' Informatico?" *Volontà*, 1984.

examples of the relationship between technological and societal vulnerability. The first related to the "accidental fallacies of technology": a human error or an interrupted signal were enough to seriously damage computers. Also the possibility to voluntarily sabotage technology highlighted its vulnerability. This could be either physical sabotage, or involve the system's "logical components," which, Borrillo claimed, were particularly relevant for future social conflict: notwithstanding the computer's complexity, it was still possible to intervene in its development by introducing different sets of logical components. Like others, Borillo stressed the importance of acquiring know-how on the functioning of computers, therefore challenging the Black Box Entanglement's micro-politics through Scientific Curiosity. In fact, observed Borrillo, "This potential will only develop as long as 'Winston Smith'[973] gives himself the scientific and technical means to do it."[974] The final aspect of the relationship between societal and technological vulnerability related to language, particularly the rigidity of computer languages. However, to Borrillo, new technologies also opened up several new spaces for communication, which could generate "affinity networks" not focused on markets and institutions. In this sense, it was possible to imagine and practice a socialist use of computers, in the anarchist way.

The year 1984 was therefore a year of Hopeful Curiosity for the anarchists. Computer debates were powerfully re-politicized, enriching the existing socialist critique of the Black Box Entanglement with perspectives from anthropological literature. And Borrillo's claim about the possibility to open new communication areas through novel technologies would be proven correct. As we shall see in the upcoming section, in the mid-1980s a new generation of grassroots left activists became increasingly interested in computers, exploring their "socialist use" both in theory and practice.

973 The protagonist in Orwell's 1984.

974 "Ma queste potenzialitá non si svilupperanno se non in quanto Winston Smith si dia egli stesso i mezzi scientifici e tecnici per svilupparle" Borrillo, "Verso Un '1984' Informatico?" 61.

5.3 “Cyberpunk is an attitude.” Hacking the Black Box Entanglement

Between the late 1970s and the early 1980s, a new youth counterculture emerged in Italy. They called themselves “punx” or “punk anarchici” (anarchist punks) or a combination of the two (punx anarchici).[975] This naming convention emphasized their political as well as musical commitment. Their main artistic references were not the most popular punk bands like the Sex Pistols or the Clash, but the more politicized Crass and all the small bands in independent, local circuits. I focus on the punx culture from Milan, as they were the ones who most notably engaged with computers. Unless I specify otherwise, “punx” refers to the Milan punx.

The punx came of (political) age in a very different societal context than the previous generation of grassroots left militants. In the late 1960s and early 1970s, Milan was a hot spot for emerging worker and student movements. The city was already a symbol of (capitalist) economic power, but this power was constantly challenged by the left. Left-wing groups were continually organizing strikes, blockades, sit-ins, squatting, demonstrations and other public political actions. By the 1980s, Milan was best known as the “Milano da bere” (“Drinking Milan”) a popular slogan conveying the image of a glamorous city, full of economic and career opportunities. To the punx, the city was also the “Milano da pere,” a pun referring to the problem of heroin addiction in the 1980s.[976] Punx’s political activism was directed not only against the State and Capital, but also against drug abuse: A popular Milan punx symbol was an anarchist “circle-A” with a broken syringe embedded, and the slogan “distruggi le illusioni, non la tua vita” (destroy illusions, not your life).[977]

The punx clearly had a crucial role in re-politicizing computers within Italian libertarian socialism. They performed emotional practices based on Creative Anger, Electric Wit, and the Principle of Hopeful Curiosity, which eventually “broke” the Black Box Entanglement both on the micro-political and macro-political level. Through a political interpretation of cyberpunk and their connection with the first European computer countercultures, the punx fostered hacking as a new political practice within the Italian left.

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975 Giacomo Bottà, “Lo Spirito Continua: Torino and the Collettivo Punx Anarchici,” in *Fight Back. Punk, Politics and Resistance* (Manchester University Press, 2016), 155–69; N. A. Del Corno, “Dai Beat Ai Punk: Dieci Anni Di Controcultura a Milano (1967-1977),” *Clionet* 1 (2017); Alessia Masini, “L’Italia Del «riflusso» e Del Punk (1977-84),” *Meridiana*, no. 92 (2018): 187–210.

976 “Pere,” literally pears, is slang for heroine abuse. “Farsi una pera” (Having a pear) means “taking heroine.”

977 For a visual reference: http://www.anarca-bolo.ch/Stellanera%20website/a_punk%20noeroina.jpg, accessed September 20, 2022.

5.3.1 Once hippies, now punks. New youth countercultures question technology

In the winter of 1980/1981, *A/Traverso* published an issue after a break of several months, aiming to "re-open a process of production-circulation which was interrupted by depression and by the infernal cycle of cynicism." Information technologies had a prominent role in this re-opening process. *A/traverso* depicted a new struggle, between the "metamachine" and the "videoelectronic tribes." The "metamachine" was "the language which speaks without being spoken by a concrete subject," in other words, contemporary capitalism language. Its aim was to maintain the status quo: "The metamachine is at work so that the future can be the eternal and expanded reproduction of what already exists."[978] The actors who could stop "the buzzing of the metamachine" were the "videoelectronic tribe," a "nomadic population" made up of the intellectual proletariat who refused to succumb to factory-jobs or other "fixed" forms of living arrangements. This tribe was the protagonist of a new mutation, able to demythify electronic technologies. The notion of "mutation" was central in this discourse. The videoelectronic tribe should not be seen as a resurgence of old practices. The political and emotional landscape had changed: "A new hippy wave, at the beginning of the 1980s? Not exactly: the 1960s freaks compared themselves to a society based on wealth, consumption, and illusory unlimited development. Today's activism stems from a civilization of catastrophe and military destruction, a civilization of fear and depression."[979]

Bologna Autonomia was among the first groups in Italy to re-politicize computer debates by discussing hacking, as we have seen with Benini and Torrealta's *Simulazione e Falsificazione*. *A/Traverso*'s description of the "videoelectonic tribe" and their feelings, further contributed to set the scene for the emergence of the Italian hacker culture in the late 1980s. However, as Antonio Caronia observed,[980] ultimately the Milan punx (not the Bologna group) had the most influence in terms of re-politicizing computer debates and design within social movements.[981] The punx were able to channel the "fear and depression" of the contemporary age, together with their anger, in a successful quest for the socialist use of computers.

978 "La metamacchina è al lavoro perché il futuro sia eterna riproduzione allargata dell'esistente". *A/Traverso*, Winter 1980/81.

979 "una nuova onda hippy, all'inizio degli anni '80? Non proprio: il freak degli anni '60 si definiva in rapporto a una societá della ricchezza, del consumo e dello sviluppo illusoriamente (illuministicamente) illimitato. Oggi chi si muove lo fa allontanandosi dalla civiltá della catastrofe e della distruzione militare, della paura e della depressione." *A/Traverso*, Winter 1980/81.

980 After *Un'Ambigua Utopia*, Caronia became a renowned intellectual and expert on the relationship between science fiction, politics and society.

981 Antonio Caronia, "Digito Ergo Sum," *Virtual*, September 1993.

The emergence of punx culture was closely related to the rise of "Social Centers" as new sites for grassroots political activism.[982] Social Centers are public self-managed spaces, related to the Squat Movement but not necessarily for housing. The punx also established a relationship with older militants from the grassroots left. From 1983, the Milan punx had a space in the famous bookshop "Libreria Calusca," run by a key figure in the history of Italian social movements, Primo Moroni.[983] The GAF also fostered a relationship with the young punx, in particular *A-Rivista*. Paolo Finzi and Maria Teresa Romiti interviewed them,[984] and the punx were invited to send articles to *A-Rivista* (which they did). Sometimes, *A-Rivista* acted as a legal shield for punx press releases. For example, the fanzine *Nero* was published as a supplement to *A-Rivista*.[985] Similar connections existed in Bologna, another key center for the 1980s punx culture. The Bologna punx initially hung out in Radio Alice circles, but eventually established their base in the same building as the anarchist circle "Camillo Berneri".[986]

This inter-generational encounter, however, was not without its problems. The existing anarchist movement was at first skeptical about these youths recreating anarchist symbols without ever having read Malatesta, as the interviews by Finzi and Romiti reveal. Conversely, some punx abandoned the fanzine *Nero*, saying "who reads that anymore? Half of the articles seem to be written by Malatesta."[987] Furthermore, the new aesthetics and the radical subversion of gender norms practiced by the punx were sometimes too radical even for the anarchists, who were from a different generation with different cultural and fashion norms. Consequently, the punx reported that they did not feel completely at ease among the "traditional" political circles.[988] Finally, some punx perceived a generalized defeatism, and even excessive nostalgia in existing political circles.[989]

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982 The first Social Centers emerged in the 1970s, particularly in Milan. Pierpaolo Mudu, "At the Intersection of Anarchists and Autonomists: Autogestioni and Centri Sociali," *ACME: An International Journal for Critical Geographies* 11, no. 3 (2012): 413–38; Pierpaolo Mudu, "Resisting and Challenging Neoliberalism: The Development of Italian Social Centers," *Antipode* 36, no. 5 (2004): 917–41; AA.VV., *Centri Sociali: Geografie Del Desiderio* (ShaKe, 1996); Balestrini and Moroni, *L'orda d'oro*.

983 After a decade in the PCI, in the 1960s Moroni was increasingly dissatisfied with the party's version of socialism and became close to the extra-parliamentary left. In 1971 he and his wife opened a traditional bookshop "Libreria Calusca," that was also a distribution center for underground and alternative press, and a meeting point for grassroots left activists. Moroni also worked briefly for Olivetti. See: Primo Moroni, *Geografie Della Rivolta: Primo Moroni, Il Libraio Del Movimento* (Dinamo Press, 2019). 24.

984 Maria Teresa Romiti, "Punk," *A-Rivista Anarchica*, April 1981; Paolo Finzi, "Intervista Ai Punx Anarchici," *A-Rivista Anarchica*, October 1983.

985 This practice was usual because all periodicals had to be authorized by a tribunal.

986 Marco Philopat, ed., *Lumi Di Punk. La Scena Italiana Raccontata Dai Protagonisti* (Agenzia X, 2006).

987 "Chi vuoi che lo legga? Metà degli articoli sembrano scritti da Malatesta". Marco Philopat, *Costretti a Sanguinare. Racconto Urlato Sul Punk*, New Edition (Agenzia X, 2016). 113.

988 See *Antiutopia* (Punk Fanzine), 1983, Archivio Agenzia X.; Helena Velena in Philopat, *Lumi Di Punk*, 2006.

989 See *Antiutopia*; *Nero*, No. 2 (Punk Fanzine), 1981, Archivio Agenzia X.; Helena Velena in *Lumi Di Punk;* Marco Philopat, *Costretti a Sanguinare.*

Unsurprisingly for the period, Punx fanzines often mobilized emotions such as fear, anxiety, anguish, and anger. Besides the shift in Italian society and politics, deeper ideological motives informed their emotional practices. The punx ideological background was a mixture of traditional libertarian themes, such as rejecting centralized power and anti-militarism, coupled with a strong emphasis on ecology and feminism.[990] Not only had capitalist ideology failed to keep its promises, but the destruction of the planet was a concern that affected the whole of humankind, on an unprecedented level. This awareness inevitably influenced their perspective on technological development. For example, punx were staunch supporters of the anti-nuclear movement, and often pointed out the destructive consequences of a nuclear accident: "there would be no technological nor literary, nor scientific development if the environment where man lives is inexorably destroyed,"[991] they wrote in the fanzine *Antiutopia*.

The punx were certainly not persuaded by Black Box Entanglement's promises. In their fanzines, they mobilized skepticism in technological development as a driver for human well-being, and concerns over its destructive potential. These emotional practices countered the Black Box Entanglement's Technopolitical Resonance because they rejected the idea of a technologically advanced capitalist society, particularly the one symbolized by US military power. The punx often extended their rejection to the entire notion of "progress." For example, in the fanzine *L'istinto del vivere* (The instinct to live), the punx harshly criticized the technological aspects of contemporary "progress" that States and capitalists promised. This critique was based on the classic trope depicting computers as tools of capitalist dominance, and mobilized concerns over a future when their presence would increase: "I am not a computer-robotics technician and I do not want to become one to understand that these cybernetics machines will overcome us."[992]

These concerns about computers' controlling potential were coupled with a strong environmental sensitivity. Not just controlling humans was problematic, but the greater control and destruction of the natural environment. The punx poem "To produce progress," powerfully mobilized mistrust in the "technological progress" that States offered: "Everything is under control, they tell us smiling // but how many are dying right now? // Where is progress in all of this?" The punx also mobilized fear, or rather "anguish" as they wrote some pages later,[993] over the consequences of this idea of

990 Anti-militarism was also a "classical" libertarian theme.
991 "Non ci sarebbe nessuno sviluppo non solo tecnologico ma anche letterario, scientifico ecc. Se l'ambiente in cui l'uomo vive viene distrutto inesorabilmente." *Antiutopia* (Punk Fanzine).
992 "Non sono tecnico di informatica-robotica e non voglio diventarlo per capire che queste macchine cibernetiche vorranno sopraffarci" *L'istinto Del Vivere* (Punk Fanzine), 1983, Archivio Agenzia X.
993 "Angoscia", in *L'istinto Del Vivere* (Punk Fanzine).

progress: “Waste, profit, brutalization of the environment // mechanization of our life. // They conquer the space and they militarize it // exactly because the earth is saturated and full of weapons and machines for disembowelment.”[994]

At the same time, some discourses mobilized the Principle of Hopeful Curiosity. These discourses also countered the Black Box Entanglement’s Technopolitical Resonance by mobilizing mistrust in its promises. In the second issue of *Nero*, the punx claimed that they refused to identify with the “information technology society” (intended as a technologically advanced capitalist society), which in their view was the same as “the Orwellian 1984 society.” But they added a further passage, encouraging greater engagement with technology within the punx movement. They thus mobilized Scientific Curiosity, by switching the focus from the “capitalist use of machines” to the “socialist use of machines.” In the same *Nero* issue, the punx discussed the importance of appropriating new technological tools, in a piece evocatively titled “Criticism of the means (radio utopia or utopia of the radio?)”[995] The piece mobilized the Principle of Hopeful Curiosity, by encouraging the use of radio technologies as a way to communicate with larger sections of the population. This meant improving knowledge of this technology’s functioning and use (scientific curiosity), while maintaining its instrumental function (principle of hope). The interest in radio technologies was not motivated by the Fear of Falling Behind on the technological level, the punx clarified, but by the need to renew and re-affirm the relevance of anarchist thought as a fundamental force for societal change: “Today, to be incisive in society, to leave a mark, to diversify […] something else is needed. Not due to fear of not keeping up with the times, but to renew the means, the medium, the tool whereby we propose an idea that is always valid in its togetherness: anarchism.”[996]

From the second half of the 1980s, the punx movement increasingly focused on the socialist use of technology, computers in particular. The third issue of the fanzine *Amen* published an article “1984! Is this the year of Big Brother?” The article mobilized mistrust in Black Box Entanglement’s promises, by arguing that computers could not achieve a real social change: “Computer tools applied to social communications operate to reconfirm what exists, and marginalize, select, exclude as ‘irrelevant’ all information linked to processes of change, struggle, and transformation of the

994 “Tutto è sotto controllo ci dicono sorridendo / ma in quanti stanno adesso morendo?/ Quale crescita in tutto questo?/ Spreco, guadagno, abbrutimento dell’ambiente/ meccanizzazione della nostra vita./ Conquistano lo spazio e lo militarizzano/ appunto perché la terra è satura e piena di armi e macchine per lo sventramento”, *L’istinto Del Vivere* (Punk Fanzine).

995 “Critica dei mezzi (radio utopia o utopia della radio?),” *Nero*, No. 2 (Punk Fanzine).

996 “Oggi per poter incidere nel sociale, per colpire, per diversificarsi […] occorre qualcosa di piú, non per l’ansia di di essere al passo con i tempi ma bensí per rinnovare il modo, il mezzo, lo strumento con cui proporre un’idea che è sempre valida nel suo ansieme: l’anarchismo.” *Nero*, No. 2 (Punk Fanzine).

social order not easy to match with the current system."[997] At the same time, the punx noted that this was not the only way to use computers. They argued, "We have in our hands, potentially, a device amplifying collective skills which has no equal in human history,"[998] thereby mobilizing the Principle of Hopeful Curiosity.

5.3.2 You can create art and beauty with computers. "Decoder" and the rise of political cyberpunk

However, the Principle of Hopeful Curiosity alone was not sufficient to overcome the punx' anguish, nor their older comrades' apathy and nostalgia. Another emotion was key for the re-politicization of computer debates among the libertarian left: anger. Particularly Creative Anger, powerfully exemplified by the 1980s grassroots left's popular political slogan: "Uscire dal ghetto // distruggere la gabbia // creare organizzare // la nostra rabbia" (Leave the ghetto // destroy the cage // create, organize // our anger).

From the second half of the 1980s, the punx found new spaces and new ways to channel their Creative Anger. In 1984, the Milan punx were evicted from the Virus social center, which had been their home for two years. From there, they moved to the social center Leoncavallo, and hung out in the bookshop Calusca. In the words of its founder Primo Moroni, the shop was "a reference point for the non-organized, the unleashed dogs, for this indefinite area which goes from the bordigists, to the proto-situationists, the counciliarists, the internationalists, the anarchists, the anarco-communists, the libertarian communists."[999] This was a pivotal time for the punx: through Moroni, they came into closer contact with the Italian left's cultural and political heritage, and further explored their interest in using new technologies as political tools.

Between 1986 and 1987, the punx launched a new magazine:[1000] *Decoder – Magazine di cultura underground* (Decoder – underground culture magazine). The name "Decoder" was a tribute to the

997 "Lo strumento informatico applicato alla comunicazione sociale opera per la riconferma dell'esistente e per emarginare, selezionare, assegnare trascurabile significato alle informazioni legati a processi di mutamento, di lotta e di trasformazione dell'ordine sociale o che, comunque, non sono facilmente omologabili al sistema." Sergio Tosini, "1984! È l'anno Del 'Grande Fratello'?" *Amen* (Punk Fanzine), 1984, Archivio Agenzia X.

998 "Abbiamo a disposizione, in potenza, un amplificatore di capacità collettive che non ha eguali nella storia dell'umanità." Tosini.

999 "Un punto di riferimento dei non organizzati, de cani sciolti, di quest'area indefinibile che va dai bordighisti, ai protosituazionisti, ai consiliari, agli internazionalisti, agli anarchici, agli anarco-comunisti, ai comunisti libertari." Moroni, *Geografie Della Rivolta: Primo Moroni, Il Libraio Del Movimento*. 51

1000 Marco Philopat, *I Pirati Dei Navigli* (Giunti, 2017); Marco Philopat, "Hackerando Decoder," *Zapruder. Storie in Movimento*, no. 45 (2018).

West German 1984 cyberpunk movie with the same name produced by Klaus Maeck.[1001] The magazine focused on where politics, technology, arts, and literature intersect. In 1988, they also set up a publishing company, "ShaKe Edizioni," specializing in similar themes. The founding of *Decoder* and Shake can be seen as a communicating emotional practice based on Creative Anger. Through these editorial projects, the punx communicated their anger, directed at two targets.

First, the punx communicated a "benevolent" Creative Anger, similar to what the PCI women mobilized against their male comrades. Bearing the brunt of this "benevolent" Creative Anger were the grassroots left members who held prejudices against technology, were uninterested in it, or were generally fixated on their own nostalgia. This anger was not communicated explicitly, but as I have mentioned, the punx felt uncomfortable with the previous generation's defeatism.[1002] The punx editorial projects were motivated by the desire to move on from this stiff situation, and bring about change. They publicly presented this desire by publishing *Decoder,* born out of a need to "change skin, without losing our identity: change the movement, or at least change ourselves, in order to not passively submit to change."[1003] *Decoder* was intended as "a son of communication, diversity, provocation."[1004] Names were also important: ShaKe Edizioni aimed "to shake up both the official culture and the movement."[1005]

Second, most of the punx' Creative Anger was directed at the traditional targets of left-libertarian criticism, Capitalism and the State. *Decoder* articles, as we shall see, were undoubtedly critical of Black Box Entanglement's macro-politics, the promise of a technologically advanced capitalist society. The punx interest in technology went hand in hand with their increased engagement with Italian leftist culture: they had certainly not lost their socialist commitment. The production and promotion of *Decoder* also powerfully challenged the Black Box Entanglement's micro-politics. *Decoder* not only claimed that a libertarian use of computers was possible, but also practiced this use. The first *Decoder* issue was compiled using the "analogical" punk fanzine method. But from the second issue, the magazine was entirely designed using computers.[1006] Promotional activities often included workshops and demonstrations about how to use computers, and *Decoder* members

1001Based on a work by William S. Burroughs, who also appeared in the movie.
1002See personal accounts in: Marco Philopat, ed., *Lumi Di Punk*; Marco Philopat, *I Pirati Dei Navigli*.
1003"Mutare pelle, senza perdere la propria identità: trasformare il movimento o, almeno, trasformare se stessi per non subire passivamente la trasformazione." Gomma, "Ciao, Compagno Primo," *Decoder*, 1998. 930.
1004"Figlio della comunicazione, della diversità, della provocazione." "Colophon," *Decoder*, 1987.
1005Philopat, *I Pirati Dei Navigli*.
1006The second issue was made with an Apple IIE and an Olivetti M20. See: *Decoder*, 1988; Philopat, "Hackerando Decoder."

participated in the early grassroots computer networks and hacking communities (see section 5.3.4).[1007]

Other emotional practices countered the Black Box Entanglement's Technopolitical Resonance in *Decoder*. From the second issue, *Decoder* published a column on computers, signed by uvLSI, the pseudonym of computer expert Gianni Mezza.[1008] Mezza/uvLSI also curated the Italian publication of Steven Levy's *Hackers. Heroes of the computer revolution*, edited by Shake Edizioni.[1009] His *Decoder* column mobilized skepticism towards the Black Box Entanglement's promises. It also mobilized Scientific Curiosity and Electric Wit, to counter both excessive concerns and excessive enthusiasm about technology. As stated in the column's second article, the goal was: "to fight the iron trust in traditional computer sciences; showing the fallibility, the fragility and the dangers of certain applications; finding an alternative interpretation of these phenomena."[1010] For example, in the fourth issue of *Decoder*, the theme was "Artificial intelligence, natural idiocy."[1011] The title mobilized Electric Wit, using irony to debunk the misconception that computers could be "intelligent." The article discussed the US military's "Strategic Computing Initiative" and DARPA project. The focus was, that however smart the machines were, interpreting key aspects of "natural languages" posed serious problems. Crucially, it was impossible to interpret ambiguity in communications. Although computer promises were many, computers' actual possibilities were disappointing. UvLSI stressed that the new technologies' power was indeed huge, but at the same time human errors and stupidity created many risks.

The fallibility of computer systems was indeed a recurring theme. Even the most fearful computer system presented weak spots. The first article by uvLSI was "Wargames?" and discussed computers' vulnerability.[1012] He mobilized Scientific Curiosity to address concerns about computers' controlling power and presented hackers' strategies for gaining access to computer systems. This showed that, even though computers could indeed have a detrimental effect on society, from a technical perspective, they were quite fragile. And "technocrats" knew very well about this fragility, uvLSI pointed out: recently, computer companies were spending increasing sums on cybersecurity,

1007Philopat, *I Pirati Dei Navigli*; Decoder, "Documentary on the Italian 'Decoder Collective,'" https://www.youtube.com/watch?v=mY2JfGTbZOU, accessed September 20, 2022..
1008Philopat, *I Pirati Dei Navigli*.
1009Steven Levy, *Hackers. Gli Eroi Della Rivoluzione Informatica* (ShaKe, 1996).
1010"Combattere la ferrea fiducia nell'informatica tradizionale, dimostrare la fallibilitá, la fragilitá e la pericolositá di certe applicazioni, trovare una chiave di lettura alternativa a questi fenomeni." uvLSI, "Il Computer è Uno Strumento?," *Decoder*, 1989, 224.
1011uvLSI, "Intelligenza Artificiale, Demenza Naturale," *Decoder*, 1990. 275-280.
1012uvLSI, "Wargames?" *Decoder*, 1988.

at times even exaggerating hackers' actual capabilities. Therefore, although computers could exert mass control, they were in turn not entirely controllable, creating problems for the very people who made them. In *Decoder* 3, UvLSI focused on computers in military systems. He again mobilized skepticism about computers' controlling power, focusing on design vulnerabilities. UvLSI pointed out that the computer's actual functioning was sometimes obscure even for experts. Because of computer systems' increasing complexity, it was very difficult to detect errors until it was too late. This was "an element of big and ill-concealed anxiety" among those working on computerized military projects. Ultimately, military systems were even more vulnerable than others: because of secrecy, fewer people scrutinized them. In other words, the more black-boxed computer systems were, the more vulnerable to design errors.

Decoder also showed that technology could be re-appropriated and used in different ways than its designers intended. This also challenged the Black Box Entanglement's micro-politics, because it showed that not only hackers could find ways to open or re-purpose the black-box. Artistic expression was a crucial tool. For example, the first *Decoder* issue suggested an artistic re-appropriation of technology applied to visual arts. This was the creative use of copy machines. The article "electrography" discussed the various "copy-art" methods and techniques which could be used in "electrography." *Decoder* swept away any concerns on machines' "dehumanizing" aspect: "The artistic use of an office machine re-launched the debate on art's dehumanization. We think this is meaningless: the copy machine is nothing but a tool which serves the artist's creative inspiration and, ultimately, a human creation. A piece of electrographic art, then, is doubly human."[1013] As Steven Levy summed up in his "hacker ethic" principles: "You can create art and beauty on a computer."[1014] Or even better: you can create art and beauty *with* a computer.

The intersection of art and technology was a crucial feature in the first Italian digital countercultures, beyond *Decoder*.[1015] In 1989, Tommaso Tozzi, who also authored early essays on Italian hacking, coined the notion "Hacker Art." Also called Subliminal Art, Hacker Art was "a form of struggle for social freedom," and an art form which could break down the barriers between artist

1013"L'utilizzazione a fini artistici di una macchina da ufficio non ha mancato di rilanciare il dibattito sulla disumanizzazione dell'arte. Ci sembra senza senso: la copiatrice non è che uno strumento al servizio dell'ispirazione creatrice dell'artista e, in ultima analisi, una creazione dell'uomo. Un'opera elettrografica è dunque umana a doppio titolo." Christian Rigal, "L'elettrografia," *Decoder*, 1987, 47.

1014Steven Levy, *Hackers: Heroes of the Computer Revolution* (Anchor Press/Doubleday, 1984).

1015On the history and significance of Art in Italian hacking cultures: Tatiana Bazzichelli, *Networking: The Net as Artwork* (Digital Aesthetics Research Centre, Aarhus University, 2009). On art and hacking see the works by Juli Lackzo: https://laczkojuli.net/hacker-culture-as-a-heir-to-the-historical-avant-garde/, accessed September 20, 2022.. On art in the history of computing: Patrick W. McCray. "Art Out of Order: Jack Burnham, the 1970 *Software* Show, and the Aesthetics of Information Systems." *Technology and Culture* 63, no. 3 (2022): 689-717.

and viewers, becoming "a temporary flow and an open process, left to the participants' spontaneous improvisation."[1016] In 1989, Tozzi and programmer Andrea Ricci created "REBEL! Virus.asm," an artistic experiment involving software which worked like a computer virus. The piece of art did not have a vicious intent nor damaged computers (it was not widespread), but momentarily took control of the machine like a virus, showing the word "Rebel!" on the screen.

5.3.3 "Take the chance!". From cyberpunks to hackers

The Italian libertarian movements' quest for a socialist use of machines reached a turning point with the publication of *Cyberpunk - Antologia di scritti politici* (Cyberpunk – anthology of political writings), by Raffaele Scelsi (a *Decoder* editor) and first published by ShaKe Edizioni in 1990.[1017] The book collected interviews, political manifestos, and articles on the political significance of cyberpunk (intended as a literary genre and imaginary), and its links with hacking. *Cyberpunk - Antologia* was a milestone in popularizing politicized hacking in Italy, also to establish a connection with the emerging European hacking culture. Scelsi described the cyberpunk imaginary as the first "winning collective imaginary" since the hippies, because it was "able to collocate in an adequate and catchy way some of the aspirations of those who are not given a voice in post-industrial society."[1018] In other words, it was the imaginary that could suggest a "credible," socialist use of computers.

The popularization of this "cyberpunk imaginary" was a fundamental step towards establishing a computer vision "Outside the Black Box Entanglement." Up to this point, libertarian socialists had established the importance of challenging the Black Box Entanglement's micro-politics by expanding their knowledge on computers' functioning. At the same time, the early 1980s radical critique of utopian visions had powerfully challenged not only Black Box Entanglement's macro-politics, but also its socialist counterpart (scientific socialism). Yet, some imaginative element was needed to successfully mobilize the right mixture of emotions and get libertarian socialists not only talking about the socialist use of computers, but actually practicing it, that is to say, re-politicize both computer debates and design.

Cyberpunk's political significance was stressed in the fifth *Decoder* issue, when Sandrone Dazieri presented Cyberpunk as a political literary genre, with strong ties to anti-authoritarian political

1016Bazzichelli, 125.
1017Raf Valvola Scelsi, *Cyberpunk – Antologia Di Testi Politici* (ShaKe, 1990).
1018Scelsi, 12.

movements. As with *Un'Ambigua Utopia*, politicized science fiction fueled debates on the political significance of actual technologies. Dazieri presented literary examples and did not discuss specific political issues, but one reader effectively explained cyberpunk's role in social movements: "Today, cyberpunk is a new form of lateral thinking: it takes control of a technology, it doesn't stop at the either-or rejection/integration, it decides that it can be used in a different way (game, or revolution) than what they were given, and throws away the manual. Cyberpunk's lateral thinking is cerebral: it is when we start to use the biological computer our way. The circle is closed."[1019]

In the introduction to *Cyberpunk – Antologia*, Scelsi discussed the connections between cyberpunk, countercultural movements and hacking, performing a mobilizing emotional practice which amplified the Principle of Hopeful Curiosity's Technopolitical Resonance. He described hacking as a means of socializing knowledge, therefore encouraging Scientific Curiosity and hope in the possibilities offered by the new machines. Inspirational sources were the last members of the dying 1970s US hacker culture, particularly Lee Felsenstein, and the European "technoanarchists," notably the German Chaos Computer Club (CCC), who had stressed hacking's political significance right from the start.[1020] "Absolutely everyone who feels cyberpunk or libertarian must know them," Scelsi claimed. But Scelsi also criticized figures like Steve Jobs and Steve Wozniak, whose life histories helped mythologize hackers as the new models for a self-made man. According to Scelsi, this mythologization deprived hacker practice of its political meaning, and led to the first hacker generation being co-opted by multinational companies. Timothy Leary, whose work featured in the anthology, was also not spared criticism. Scelsi negatively pointed out that his work contained a "flat exaltation of scientific progress" and a "positivist anxiety."[1021] Although computers were an important political tool, Scelsi remarked that human agency was the most important aspect for creating a new society (Principle of Hope). The introduction therefore ended with cyberpunks' invitation to "Take the chance!" by fostering this new imaginary, "a collective imaginary, able to dismantle the tenacious imaginative veil of our days, which has been compromising us for a long time."[1022]

1019"Oggi il cyberpunk è un'altra forma di pensiero laterale: s'impadronisce di una tecnologia, non si ferma all'aut-aut rifiuto/integrazione, decide che può usare in un altro modo (per gioco o per la rivoluzione) quello che gli hanno messo a disposizione e butta via il libretto delle istruzioni. E il pensiero laterale e cyberpunk cerebrale: è quando iniziamo a usare il computer biologico a modo nostro. Il cerchio si chiude." Robertino da Pisa, "Lettere," *Decoder*, 1991, 447.

1020For the history of CCC see: Kai Denker, "Heroes yet Criminals of the German Computer Revolution," in *Hacking Europe* (Springer, 2014), 167–87.

1021Raf Valvola Scelsi, "Mela al Cianuro," in *Cyberpunk - Antologia Di Testi Politici* (ShaKe, 2007), 35.

1022"[Un] immaginario collettivo, capace di scardinare la tenace cappa immaginativa esistente, dalla quale da piú tempo si è compromessi." Scelsi, 38.

This invitation was certainly more appealing given that political interest in hacking was growing across Europe. The articles about existing hacker communities functioned as a mobilizing emotional practice. These articles amplified the Principle of Hopeful Curiosity's Technopolitical Resonance, by mobilizing a hacker version of the traditional "Working Class Pride" —indeed, a famous international symbol of hacker movements today is a clenched fist holding thunderbolts, a powerful reference to the workers' movement.[1023] Learning about other politicized hacking communities in Europe reinforced the idea that a libertarian use of machines was indeed possible and necessary. It was already happening everywhere. From this perspective, the most notable item in the Cyberpunk anthology was the final declaration from Icata '89 – Galactic Hacker Party. This was the first (documented) large international hacking meeting held in Europe. In August 1989, hackers from all over the globe gathered in Amsterdam for a "galactic hacker party."[1024] The participants drafted a final declaration, seen as a fundamental manifesto for the emergence of a politicized European hacker culture.

The Icata '89 declaration called for a global alliance against Black Box Entanglement's micro-politics, by demanding that any access restriction to computers be eliminated: "The free and unfettered flow of information is an essential part of our fundamental liberties and shall be upheld in all circumstances. Information technology shall be open to all, no political, economic, or technical consideration shall be allowed to impede this right,"[1025] stated the first point. The declaration went on to state the importance of having technology openly available to everyone, thereby mobilizing Scientific Curiosity. But the declaration also stressed the centrality of human agency in technological development. Thus the Icata '89 declaration amplified the Principle of Hopeful Curiosity, by encouraging a human-centered, socialist use of computers. It stressed the importance of individual privacy ("AVAIL PUBLIC DATA FREELY, PROTECT PRIVATE DATA STRONGLY is our motto"),[1026] reclaimed the choice to use "appropriate" technologies,[1027] and argued for a technological development accompanied by progressive and ecological thinking.[1028]

1023See: https://commons.wikimedia.org/wiki/File:Cyber_Rights_Now!.jpg, accessed September 20, 2022.
1024Caroline Nevejan and Alexander Badenoch, "How Amsterdam Invented the Internet: European Networks of Significance, 1980–1995," in *Hacking Europe* (Springer, 2014), 189–217.
1025Galactic Hacker Party, "Icata'89 Declaration," n.d., http://www.lucsala.nl/myster/school/icata89.html, accessed September 20, 2022.
1026Capital letters in original text.
1027"The right to information goes together with the right to choose the carrier of that information. No model or format of information shall be imposed upon any individual, community or nation. Especially, the pressure to adopt inappropriate "advanced" technology shall be resisted. Instead, user-friendly, low-cost & low-demand methods and equipment shall be evolved." Galactic Hacker Party, "Icata'89 Declaration."
1028"Computers and information technology shall become a tool to evolutionize our living planet. The creation of Artificial Intelligent Communication shall safeguard Nature against the evil of commercial Human over-population." Galactic Hacker Party.

Not only hackers and computer experts stimulated the Italian Cyberpunk imaginary. One of the interviews published in the Cyberpunk anthology, an excerpt from a *Decoder* article, was with the artistic collective Mutoid Waste Company.[1029] The Mutoids, as they are colloquially called, were established in the UK in the 1980s, but rapidly became a "nomadic" group, periodically moving to different cities and countries. They are famous for their spectacular artistic creations: huge mechanical creatures made of waste, sometimes with moving parts. The Mutoids stressed the importance of radical change in crisis situations, particularly in frightening times: "men and things must physically mutate, and these changes must be profound if we want to survive a disaster or a post-apocalypse."[1030]

The idea of a "mutation" made necessary by contemporary technological development was a very resonant one in the period. There was a parallel growth in interest for cyberpunk at the A/Traverso group in Bologna. Between 1989 and 1992, Bifo published three editions of a booklet called *Cancel & Piú cyber che punk* (Cancel & More Cyber Than Punk).[1031] In a continuation of earlier *A/Traverso* writings, Bifo's version of Cyberpunk emphasized "simulation" and "mutation." As he explained in the 1991 book *Politiche della Mutazione* (Politics of Mutation): "critical thinking shakes in horror when faced with the idea that social man is increasingly modeled after Technique's developments, and particularly when confronted with the idea that conscious life is increasingly an effect of simulation."[1032] But this was only a "humanistic prejudice." Bifo observed that there was no such thing as an "original humanity": humanity had always adapted to its environment. Therefore, mutation had to be embraced. However, embracing mutation also implied abandoning the old communist dream of overthrowing the capitalist system. "The accumulation and proliferation of intelligent forces—the millions of students, artists, designers, scientists and hackers walking the streets of our world—cannot in any way overthrow the colossal stupidity of national or ethnic belonging, nor tear down the absurdity of capitalism,"[1033] but this new "socially disseminated

1029Mara Cerquetti, Caterina Nanni, and Carmen Vitale, "Managing the Landscape as a Common Good? Evidence from the Case of 'Mutonia'(Italy)," *Land Use Policy* 87 (2019): 104022; Luigi Pagliarini and Henrik Hautop Lund, "The Development of Robot Art," *Artificial Life and Robotics* 13, no. 2 (2009): 401–5; Rote Zora, *Mutate or Die. In Viaggio Con La Mutoid Waste Company* (Agenzia X, 2020).

1030"Uomini e cose devono mutare fisicamente e i cambiamenti in un disastro o una post-apocalisse devono essere profondi se si vuole sopravvivere". Berliner Posse, "Intervista Alla Mutoid Waste Company," *Decoder*, 1990. 345.

1031In 1991 the A/traverso group founded publishers "Synergon," offering computer courses and IT services. This short-lived project was an interesting attempt to combine theory and practice, publishing books about the societal and political significance of new technologies and providing practical knowledge about computers.

1032"Il pensiero critico freme di orrore di fronte all'idea che l'uomo sociale sia sempre piú modellato dagli sviluppi della Tecnica, e particolarmente di fronte all'idea che la vita cosciente sia sempre piú un effetto di simulazione." Franco "Bifo" Berardi, *Politiche Della Mutazione* (Synergon, 1991). 14.

1033"L'accumulo e la proliferazione delle forze intelligenti -i milioni di studenti, di artisti, di progettisti, scienziati ed hackers che camminano le strade del mondo- non puó in alcun modo rovesciare la colossale stupidità

creative force" could at least live in a world which was "asymmetrical" to the dominant one. Which is to say, a world "outside" the Black Box Entanglement, attainable (also) through the socialist use of computers.

In the 1990s, the political interest in new technologies grew within the Italian left, fostered by the new cyberpunk imaginary and the accompanying emotional practices. The Cyberpunk anthology was presented at a theater festival in Sant'Arcangelo di Romagna, near Bologna in 1990. The festival organizers invited the ShaKe edizioni group to curate some program sections. The event became an important coming together for the various punx (and cyberpunk) groups which had formed around Italy. One of the main mutations in the history of the Mutoids Waste Company happened at the festival. The Mutoids were invited to give an artistic performance, and after the festival, a group of them decided to permanently establish themselves in Sant'Arcangelo, where they still are today.

5.3.4 The utopia, the city, the computer. From urban space to cyber space, and back

In 1991, Bologna hosted the conference "L'Utopia e la Cittá" (The Utopia and the City), organized by the Free Organization of Anarchist Studies (Libera Associazione di Studi Anarchici), a group recently established by Carlo Doglio and others. The conference discussed whether it was still possible to envision a "communitarian" and left-libertarian utopia in modern cities. This was certainly a less entertaining and memorable gathering than the 1990 Sant'Arcangelo festival, yet it was an interesting meeting point for different generations and groups of activists seeking the socialist use of machines: Carlo Doglio, also one of the organizers; Raffaele Scelsi, editor of the book *Cyberpunk*; and members of the Bologna Social Center "l'Isola nel Kantiere," a key site for the history of Bologna's punks, cyberpunks, and hackers. This conference further exemplifies the political meaning that cyberpunk and hacking had acquired in Italy. It also shows that the first Italian political cyberspaces were very much connected with physical, urban spaces. When the first "hacktivists"[1034] mobilized the Principle of Hopeful Curiosity, they were not thinking about some imagined future society built with computers. Instead, they were interested in exploring computers' political potential to change their own societies, focusing on the very concrete societal and political problems which mattered to them, beyond technological development.

dell'appartenenza nazionale od etnica, e neppure puó abbattere l'assurdità del capitalismo." Berardi. 65.

1034A popular term describing hackers engaged in political activism.

Technology's significance in the "communitarian utopia" was stressed in the conference introduction: "The relationship between communitarian utopia and technology is a disenchanted one, perhaps similar to hackers' relationship with information technologies. For this reason, the communitarian utopia still belongs to the collective imaginary, and often works as a 'counterbalance' to the apocalyptic imaginary of the 'dehumanized' and solitary life characterizing today's metropolis."[1035] The "metropolitan" equivalent of this communitarian utopia was found in Social Centers, communication and arts labs, and all the places somehow able to exist inside the city, but also outside (and against) "the city as it is managed by the State, and by the speculation of the real estate sector and the mafia.[1036]"

Raffaele Scelsi gave a speech titled "Cyberpunk as a new social attitude in the post-Fordist city."[1037] Scelsi traced a brief history of the relationship between countercultural youth movements and the urban space, starting with the Milan hippy movement and ending with Cyberpunk. He also addressed the decline of US hacking and cyberpunk movements. There, most of the 1970s and 1980s hackers worked in companies, reproducing the same economic and political structures they used to criticize. However, Scelsi also underlined the importance of seeing cyberpunk not as a political movement, but rather "a social attitude, a new way to approach technology." This new way was marked by the total rejection of the Black Box Entanglement: on the macro-political level, Fear of Falling Behind had no appeal whatsoever because the libertarian movements' goal was precisely to avoid capitalism's computer promises. On the micro-political level, hacking called for a radical opening of computers' black box: both hardware and software had to be freely available to tinker with, regardless of the impediments set by companies, policymakers, or tribunals, what the GAF had called the techno-bureaucracy.

Scelsi concluded his speech by mobilizing skepticism towards hackers' mythologized image as people capable of accessing unthinkable information sources. While cyberpunk literature was a fundamental source of inspiration for the hacker movement, it was important to be aware of the line between fiction and reality, and not fall into easy but naive enthusiasm. Hackers alone would not bring down capitalism, nor could capitalism be brought down by tampering with its technological

1035"Il rapporto fra l'utopia comunitaria e la tecnologia è un rapporto disincantato come forse è oggi il rapporto degli hackers con l'informatica. Per questo l'utopia comunitaria è ancora integra nell'immaginario collettivo e spesso funge da 'contraltare' all'immaginario apocalittico della vita 'disumanizzata' e solitaria nelle metropoli d'oggi." "L'Utopia e La Città" (Libera Associazione di Studi Anarchici, 1991). 5.

1036Libera Associazione di Studi Anarchici. 6.

1037Raffaele Scelsi, "Il Cyberpunk Come Nuova Attitudine Sociale Nella Città Postfordista," in *L'Utopia e La Città* (Libera Associazione di Studi Anarchici, 1991).

apparatus. Scelsi observed that computers were mostly interesting as tools bringing together and reconfiguring all the pieces of "societal knowledge" scattered in powerful yet fragmented capitalist societies. This was "the most credible thing which can be done today in Italy and Europe [with computers],"[1038] according to Scelsi, who unknowingly addressed the challenge posed by Sergio Ristuccia at the 1971 Olivetti conference: finding not just a socialist use for computers, but a "credible" one.

The conference ended with contributions by activists from the Social Center "l'Isola nel Kantiere" (INK, The Island on the Konstruction Site). These contributions pointed at the first concrete steps being taken towards the credible, socialist use of computers by Italian social movements. INK was described as: "a place where we experiment with irrecoverable forms of symbolic communication, in other words, which are not computable."[1039] This meant being part of something similar to a "neural network," made up of a number of centers and no leadership. Although not clarified in INK's contribution (but mentioned by Scelsi), INK was an important node in an emerging computer-networked community of socialist grassroots movements.[1040] An early example was the computer network "Okkupanet," established by the student activists from the Panther Movement in 1989.[1041] The movement is most known for using a fax as communication tool, as mentioned by Pietro Ingrao during the final PCI debate (see section 4.2.4), and they also established one of the earliest political computer networks in Italy.[1042] The Panther Movement was joined by the the PCI youth section (Federazione Giovanile Comunisti Italian, FGCI). In this way, Okkupanet was formed at a time when Technopolitical Resonance was powerfully established among various groups in the Italian socialist spectrum, from the young communists to the young anarchists. This Technopolitical Resonance was based on the Principle of Hopeful Curiosity and the students' Creative Anger, that were communicated and mobilized through the innovative use of technology in the protest.

Okkupanet did not outlive the Panther Movement, but in the early 1990s, Italian socialist movements increasingly used Bulletin Board Systems (BBS). From 1990, Italian activists joined the European Counter Network (ECN), a computer network first envisioned in 1989 to connect socialist

1038Scelsi. 85.
1039"È un luogo dove vengono sperimentate delle forme di comunicazione simbolica di tendenza irrecuperabili, cioè non computabili", Scelsi. 87.
1040Isola nel Kantiere, "INK 3D (Fanzine)," 1991, Archivio Grafton 9.
1041Diego Cavallotti, "La Pantera Siamo Noi," *Zapruder. Storie in Movimento*, no. 45 (2018); "La Pantera in Tempo Reale," *Il Manifesto*, March 28, 1990.
1042Okkupanet was established through the VAX computer network, connecting science faculties through the proprietary system DECnet. Alessandra Renzi, *Hacked Transmissions*.

grassroots movements at a European level.[1043] Italy was very active in ECN, and several local groups were established. ECN therefore became not just a channel for exchanging information with other European activists, but also for communication and information among Italian activists. Beside ECN, other BBS networks were set up by left-wing grassroots movements. In March 1991, during a three-day event at Isola Nel Kantiere, a "cyberpunk network" was launched on the popular, non-politicized BBS Fidonet.

In the early 1990s, however, both in the cyberspace and in the urban space, the early hacker communities were being increasingly criminalized in Italy. In the 1980s already, the PCI magazine *l'Unità* published negative articles on hacking, using the word "hacker" as a synonym for "criminal."[1044] But in the 1990s, the Italian hacker community got involved. The cyberpunk network was expelled by the Fidonet sysadmins shortly after its creation, following a fear-mongering campaign against hackers by the Italian press.[1045] Alongside the online fear-mongering there was also off-line fear-mongering, involving L'Isola nel Kantiere. In that period, a wave of violent crimes shook the city of Bologna, by what was known as "the white Uno gang."[1046] Eventually, it turned out that all the gang members worked in law enforcement. But at first, Bologna's city council and the local press tried to pin the crimes on the grassroots left. This criminalization justified L'Isola nel Kantiere's eviction.

Undoubtedly, L'Isola nel Kantiere's history, including the "cyberpunk telematic network" and the emerging hacker communities, were all part of the history of Italian socialism. Cyberspace could not be separated from urban space, and both were strongly rooted in Italy's landscape. The 1990s "hacktivists" were criminalized as 1970s activists. The fear-mongering campaign against the grassroots left in Bologna was immortalized by Isola Posse All Star, a hip-hop band linked to Isola Nel Kantiere, in a song titled "Stop al panico!" (stop panicking). The song powerfully communicated the youth's Creative Anger, and became an anthem for early 1990s left-wing youth movements. It established a parallel between two mobilizing emotional practices centered on fear, connecting current events with recent Italian history. On the one hand, the song's lyrics highlighted the fear mobilized by the White Uno gang, and by the 1970s political violence. On the other hand, the State instilled fear of libertarian social movements, suspected of being involved in today's crimes as well as former violence. The Isola Posse All Star band stressed how the State kept using

1043Renzi; Arturo Di Corinto and Tommaso Tozzi, *Hacktivism: La Libertà Nelle Maglie Della Rete* (Manifestolibri, 2002).
1044Tozzi, *Le Radici Dell'Hacktivism in Italia*.
1045Di Corinto and Tozzi, *Hacktivism*. 210.
1046"Uno" was the type of Fiat car the criminal gang used.

the grassroots left as a scapegoat instead of addressing the real sources of societal and political concern. “And here again the hidden instigators and the tension // the diffidence, the division, the illusion falls, it falls, it falls in an ambush: // Leaden rain, blood on the cobblestones, but like for Piazza Fontana, // I am the beast and not those sons of bitches...”[1047] Hip-Hop’s graphic language should not distract from the many historical references in these lyrics. “Hidden instigators,” “tension,” “ambush,” “leaden rain,” and of course “Piazza Fontana” were all references to 1960s and 1970s political violence.

In 1994, the lively Italian BBS culture came to a halt after massive police investigations, based on accusations of “criminal conspiracy, contraband, illicit software duplication, computer fraud, altering computer and/or telematics systems.”[1048] The investigation went well beyond the more politically radical online communities, involving a large part of the Italian FidoNet network. Law enforcement did not find what they were looking for, though the BBS scene never recovered from the event.[1049] But Bulletin Board Systems were only a tool, and the Internet soon made them obsolete. This shift did not discourage the early hacker communities, which flocked to the World Wide Web. What mattered, was that a way had been found to achieve a credible, socialist use of computers: the black-box was broken, and could not be closed again. Throughout the 1990s, the Creative Anger, Electric Wit, and Hopeful Curiosity of the politicized cyberpunks, now “mutated” into hackers, resonated powerfully. This fostered an emerging extended network of “medialabs” and “hacklabs,” cyberspaces and urban spaces where experiments could be done with new technologies, outside the Black Box Entanglement.[1050]

1047“E qui di nuovo i mandanti nascosti e la tensione // La diffidenza, la divisione cade l'illusione, cade, cade in un agguato: // Pioggia di piombo, sangue sul selciato, ma come per piazza Fontana, // Sono io la bestia e non qui figli di puttana...” Stop al Panico! Isola Posse All Star, 1991.

1048Bazzichelli, *Networking: The Net as Artwork*. 82.

1049Carlo Gubitosa, *Italian Crackdown: BBS Amatoriali, Volontari Telematici, Censure e Sequestri Nell’Italia Degli Anni’90* (Apogeo Editore, 1999); Peter Ludlow, “Appendix 2: Hardware 1: The Italian Hacker Crackdown,” in *High Noon on the Electronic Frontier: Conceptual Issues in Cyberspace* (MIT Press, 1996).

1050Renzi, *Hacked Transmissions*; Luther Blisset, “Make Media, Make Trouble: Hacking the Infocalypse in the Italian Telestreet,” *Arena Magazine*, no. 70 (2004): 38–40; Laura Beritelli and Autistici/Inventati, eds., *+ KAOS: Ten Years of Hacking and Media Activism* (Institute for Network Cultures, 2017); Maxigas and Autistici/Inventati, “Circuiti Di Hacking: Manutenzione e Riparazioni,” *Zapruder. Storie in Movimento*, no. 45 (2018).

5.4 Conclusion. Outside the Black Box Entanglement

In this chapter I have analyzed the re/de-politicization of computer debates and design within three groups of libertarian socialists: the social anarchists GAF; the libertarian communists of the Bolognese Autonomia, in particular the Radio Alice group; and the anarchist punx counterculture, particularly in Milan. All these groups mobilized the Principle of Hopeful Curiosity counteracting the Black Box Entanglement, but they were not always able to establish Technopolitical Resonance in their wider political circles. Libertarian socialists were the first to re-politicize science and technology debates within the Italian left (with Errico Malatesta), and the last to re-politicize computer debates and design.

Within social anarchism, the main obstacle for long-lasting re-politicization was the discontinuation of computer debates. In the late 1960s, social anarchists and Olivetti employees Carlo Doglio and Antonio Scalorbi mobilized the Principle of Hopeful Curiosity during debates on reviving Italian anarchist tradition. By doing so, they fostered an initial re-politicization of computer debates. However, in the following years, computers faded from the anarchist radar. Computers were de-politicized, because they were no longer discussed. By the late 1970s, computers were re-politicized in Italian anarchist movements, thanks to works by Murray Bookchin and Ernst Schumacher. Their discourses on computers countered the Black Box Entanglement by arguing that technology could be designed following different principles and priorities than those imposed by capitalism. They also amplified the Technopolitical Resonance of the Principle of Hopeful Curiosity by encouraging the search for a human-centered, “appropriate” and “liberating” technology.

Within the Bologna libertarian autonomia, the re-politicization of computer debates was more consistent. From the mid-1970s, the Radio Alice group powerfully mobilized the Principle of Hopeful Curiosity and Electric Wit in order to foster a re-politicization of the debates and use of technology among the grassroots left. By the end of the 1970s, the group was discussing computers, however, they were a small and circumscribed group in the wider panorama of Autonomist Marxism, which was then focusing on the “capitalist use of technology” (automation in the workplace). They were also hit by the State’s massive repression against Autonomia. Radio Alice, that exemplified how the use of technology could be re-politicized, was closed.

The 1980s, however, turned out to be a prolific period for the re-politicization of computer debates within Italian libertarian socialism, among both anarchists and libertarian communists. This re-

politicization mostly happened on the macro-political level. Critical interest was growing in the significance of “utopia” within libertarian socialism, informed by the writings of Marie Louise Berneri and Ursula Le Guin, who discussed utopia’s “authoritarian” and “ambiguous” aspects. Their works mobilized the Principle of Hope, and later fostered the mobilization of Scientific Curiosity, and of mistrust in the Black Box Entanglement’s macro-politics. The popularity of Berneri and Le Guin’s works also coincided with the Orwellian year 1984. Like for the democratic socialists, this year did not mark the arrival of a totalitarian technological society for libertarian socialists. Computer debates linked to the year 1984 instead mobilized the Principle of Hopeful Curiosity, fostering a re-politicization of computer discourses.

From the second half of the 1980s, both the micro and the macro-politics of computing were re-politicized. This happened when the anarchist punx directed their Creative Anger at both the Black Box Entanglement and the previous generation of activists’ nostalgia. The punx made a commitment to re-politicize computers within the grassroots left. Through the magazine *Decoder*, the punx mobilized Scientific Curiosity to encourage learning about computers; they mobilized Electric Wit to ease concerns over the misuse of technology; and mobilized mistrust in the promises of the Black Box Entanglement. Through the political interpretation of Cyberpunk, the punx mobilized the Principle of Hopeful Curiosity, showing that a socialist use of computers was possible. Later, through their engagement with early computer networks, the punx showed that the libertarian use of computers was not only possible: it was credible, and practicable, in the here and now. In other words, they broke computers’ black box. They were no longer punx, but hackers.

Conclusion

Beyond the Black Box Entanglement: Technopolitical Resonance from the Computer Age to the Digital Age

In the first two decades of the 21st century, only two of the "Three Ages" which marked the previous epoch seem to have remained: the "Computer Age" and the "Age of Anxiety." Leaving behind the "Age of Extremes," however, did not help solve the typically crucial tensions between emotions, technology, and politics in the 20th century. As Alain Ehrenberg poignantly observed in his historical and sociological study on depression, "Change had long been a desirable thing because it was linked to the idea of progress, which was meant to continue unabated, and to social protection, which could but increase. Today, change is perceived in an ambivalent way because the fear of falling, of not emerging unscathed, has taken over hopes for upward social mobility. Change has given way to notions of vulnerability, insecurity, and a precarious existence. We are changing, of course, but that does not necessarily mean we are progressing."[1051]

In this concluding chapter, I start by presenting some final notes on Technopolitical Resonance and the Black Box Entanglement, based on my research on the 20th century history of computing. In section 1, I summarize my main findings and discuss the advantages and limitations of the concept "Technopolitical Resonance." In the rest of the chapter, I reflect critically on emotions and politics in contemporary computer debates and design. I show how the Black Box Entanglement still fosters a de-politicization of computer debates and design in the 21st century, with examples from the software industry and European Union policy documents on "Europe's Digital Decade." Then, I zoom in again on the Italian context to show how the historical debates presented here have extended to the 21st century. Examining them reveals the lessons that can be learned from the Italian history of computing, and can foster a re-politicization of computer debates in our times.

1051Alain Ehrenberg, *The Weariness of the Self: Diagnosing the History of Depression in the Contemporary Age* (McGill-Queen's University Press, 2010).

1. Technopolitical Resonance in the Cold War. Final remarks

This dissertation has looked at the political significance of emotions in shaping the Computer Age. I was particularly interested in how "technology by fear"[1052] affected the re-politicization and de-politicization of computer debates and design during the Cold War. I investigated a phenomenon which I call Technopolitical Resonance. This is the connection established between actors when they publicly perform their technopolitical feeling-thoughts through emotional practices. I embarked on a journey starting in the USA, with the military-industrial complex, the 1960s counterculture, behavioral scientists, and the first hackers. Along the way, I encountered a range of actors involved in Italian political history: labor unionists, armed revolutionaries, Marxist intellectuals, Communist Party members, socialist women and feminists, libertarian communists, social anarchists, and youth social movements.

All these actors were brought together because they either performed, or witnessed the performance of the Black Box Entanglement. That is a technopolitical feeling-thought claiming that those who do not adopt "black-boxed" computer technologies will fall behind the upcoming Computer Age. The "Computer Age" was intended as a technologically advanced capitalist society, explicitly in opposition to Soviet Communism. An appreciation for technological determinism was also crucial in these feeling-thoughts. The Fear of Falling Behind the Computer Age was also associated with enthusiasm about technological development, and faith in its overall positive outcomes. These feeling-thoughts ultimately had a de-politicizing effect, because they did not contemplate the possibility of political alternatives—neither on the macro nor on the micro-political level: that specific "Computer Age" was the only possible computer age, and designing computers as black-boxes was the way to achieve it. However, actors engaged very differently with this fearful narrative, displaying a wide array of emotions.

The Black Box Entanglement, as discussed in chapter 1, stemmed from the US military-industrial complex's technopolitical feeling-thoughts during the Cold War. In the USA, the Black Box Entanglement's Technopolitical Resonance was amplified by behavioral scientists investigating (and regulating) people's attitudes towards computers. In Italy, the Black Box Entanglement's Technopolitical Resonance was notably amplified through IBM's Italian branch. The company's outreach activities mobilized fear of falling behind the technologically advanced capitalist society

1052Technology promoted through a fearful narrative. See: Karena Kalmbach, "Fear and Technology in Modern Europe," in *Anxiety Cultures* (Johns Hopkins University Press, forthcoming).

brought about by computers, an “IBM Society” achievable through “IBM rationality.” But the company did not significantly share technological know-how in Italy, and its R&D investments were very low. IBM labor unions mobilized Working Class Pride and Scientific Curiosity to counter the Black Box Entanglement, though they achieved modest results. They were able to re-politicize computer debates within the company, but could not intervene on IBM design choices and manufacturing processes. IBM’s Italian management publicly sided with the company’s US management when labor unionists asked for greater technology investments in Italy, refusing support for these investments. The Black Box Entanglement was also strengthened by the revolutionary socialists of the “armed party,” though unwillingly. By mobilizing Class Hatred, they rejected the opportunity to re-politicize computers, ultimately reinforcing the idea that the Computer Age was the same thing as IBM Society, and keeping computers as black-boxes.

The Black Box Entanglement was sometimes countered by the Socialist Fear of Falling Behind. Members of the Italian Communist Party performed this fear through mobilizing emotional practices, establishing Technopolitical Resonance with the French and Soviet Union Communist Parties. Socialist Fear of Falling Behind countered the Black Box Entanglement by showing a different path for the Computer Age, based on socialism, not capitalism. The French and Italian Communist Parties mobilized this fear against IBM’s influence in Europe, thereby fostering the opening of computers’ black-boxes. However, this narrative also had a de-politicizing effect: it was based on the same technological determinism informing the Black Box Entanglement, and prioritized technology experts over perspectives from other knowledge fields. It thus reduced the scope for human agency and democratic participation in the making and adoption of computers.

These examples should not lead to over-generalizations on the de-politicizing effect of fear. For example, Fear of Falling Inside was mobilized in order to re-politicize computer debates. This happened both in the USA through 1960s Counterculture, and in Italy, through the Federated Anarchist Groups (GAF): Fear of Falling Inside US capitalism, or inside “technobureaucracy,” was mobilized to encourage greater political engagement with computer technologies. Another example is the pair Revolutionary Fear/Trust. As we have seen, in the Italian case, violent attacks on computers happened within a larger de-politicizing discourse. These attacks often had a symbolic political significance, rather than highlighting the specific implications or vulnerabilities of computer technologies. But in other cases, most famously the Luddites, destroying or otherwise

sabotaging machines was a carefully orchestrated political practice, coupled with concrete proposals for different forms of technology governance.[1053]

Italian socialist culture also presented a "third way" in the US/USSR Cold War dichotomy, both on the political and technological level, which had a powerfully re-politicizing effect when performed through emotional practices. I called these technopolitical feeling-thoughts "The Principle of Hopeful Curiosity": centrality of "utopian imagination" over "scientific socialism" and similar deterministic visions of socialism; pessimism of the intellect (critical thinking) and optimism of the will (centrality of human agency); trust in science's emancipatory potential; eagerness to improve one's scientific knowledge. In short, the Principle of Hopeful Curiosity highlights the significance of human agency in making both socialism and technology, fostering hope for a human-centered, socialist use of technoscientific knowledge. Both Errico Malatesta and Antonio Gramsci mobilized the Principle of Hopeful Curiosity: there was Technopolitical Resonance between them. Their criticism of technological determinism influenced Italian socialists' debates on science and technology's political significance. Equally crucial were Malatesta's and Gramsci's calls to improve the working classes' scientific education, considered a fundamental means for their emancipation. A third actor taking part in this Technopolitical Resonance was computer entrepreneur Adriano Olivetti, who performed the Principle of Hopeful Curiosity through his endeavor to craft a human-centered Computer Age.

The Principle of Hopeful Curiosity was again amplified in Italian socialists' 1960s-1980s computer debates. In the late 1960s, there was Technopolitical Resonance between social anarchists, democratic socialists, libertarian communists, and socialist intellectuals and researchers: they all mobilized the Principle of Hopeful Curiosity in their debates on technology, while youth social movements started experimenting with the political and creative use of communication technologies. However, the increasingly tense political climate fostered irreparable divisions within the Italian left.

From the 1970s, the Principle of Hopeful Curiosity was still being amplified, but through discourses which often evolved independently from each other. In the early 1970s, social anarchist and Olivetti employees Carlo Doglio and Antonio Scalorbi amplified the Principle of Hopeful Curiosity within social anarchist groups. In the mid-1970s, the Italian Communist Party most notably amplified it.

1053Johan Schot, "The Contested Rise of a Modernist Technology Politics," in *Modernity and Technology*, by Thomas J. Misa, Philip Brey, and Arie Rip (MIT Press, 2003), 257–78.

Independent Marxist intellectuals, for example Paola Manacorda, another former Olivetti employee, had an important role. Towards the end of the decade, it was the turn of Bologna-based libertarian communists, and then Milan-based social anarchists. In the first half of the 1980s, they were joined by feminists and socialist women groups, who introduced a gender perspective about the Black Box Entanglement. The year 1984 was very significant for the Principle of Hopeful Curiosity's Technopolitical Resonance. The Italian Communist Party, the social anarchists, and the emerging left-libertarian punx counterculture, produced reflections on the current political significance of "Orwell's prophecy," mobilizing and regulating the Principle of Hopeful Curiosity. Till the end of the decade, youth social movements (including the punx, but also a new generation of activists), became the ones who most powerfully amplified the Principle of Hopeful Curiosity's Technopolitical Resonance. Also social anarchists (Carlo Doglio), and members of the Italian Communist Party (Pietro Ingrao) mobilized the Principle of Hopeful Curiosity in this period.

However, even when the Principle of Hopeful Curiosity was amplified, the re-politicization of computer debates did not necessarily foster an actual re-politicization of computer design or use. Two emotions were important, namely Electric Wit and Creative Anger. These emotions, when mobilized and communicated by socialist women and by the punx, also amplified the Principle of Hopeful Curiosity's Technopolitical Resonance. Moreover, these emotions were important for fostering the birth of a politicized hacker community, engaged in new political practices which could "break" computers' black-boxes.

Some general observations can be draw on the insights which can be gained when looking at emotions-as-practices[1054] in the history of computing. Practice theory is a vast corpus of methodological options and theoretical insights, which I only partially employed in this work. I looked at emotions-as-practices mostly in the sense that I've been guided by Scheer's exhortation about "thinking harder about what people are doing" when they are performing emotions. This meant investigating more closely the relationship between what people are "saying" and what they are actually "doing." CAP authors did not follow this approach, with negative consequences on their research practice: there is an evident mismatch between CAP authors' claims on the urgency to address computerphobia, and the actual behavior of US citizens: although not enthusiastically, and perhaps even anxiously, most people eventually used computers. The misinterpretation of Counterculture's criticism as "computerphobia" is an example of what happens when practices are

1054Scheer, Monique. "Are emotions a kind of practice (and is that what makes them have a history)? A Bourdieuian approach to understanding emotion." *History and theory* 51, no. 2 (2012): 193-220.

taken into account, but not their "situatedeness."[1055] Emotionally charged discourses, such as Mario Savio's "Body Upon Gears" speech, were accompanied by complementary practices, most famously the public sabotage of IBM punched cards: this political practice showed that Counterculture's emotions towards computers were so unfavorable that they physically damaged these objects. However, this was not the only practice performed around computers by Counterculture's activists. If we situate punched card burning, and other forms of computer sabotage, within the history of the US Counterculture, two important findings emerge. First, this practice was about a lot more than just computers: computers were not only tools bringing dehumanization, but also symbolized the US military-industrial complex' worldview and its ubiquitous power. Second, sabotaging computers was no the only practice performed by the Counterculture: tinkering and experimenting were also practiced. In fact, CAP authors' terminology had to be revised after the arrival of hackers, actors who could be classified as "computerphobics" because of their vision on the socio-political implications of computers, but also enjoyed working with computers.

The case study on IBM Italia presented in chapter 3 further shows the insights obtainable when looking at emotions-as-practices. Two very different actors are exemplary in this sense: IBM Italia management, and the armed party. IBM management promoted computers under the threat of falling behind IBM society. But, if we look at what IBM management was "doing", and not only at what it was "saying," then we see that management had an active role in keeping Italy behind. In fact, workers request for increased R&D were denied, and instead of quenching the Fear of Falling Behind they actually generated an even stronger mobilization of this fear by IBM. The armed party case, on the other hand, invites to pay particular attention to "the situatedness" of people's doing. Computer sabotage might be a quite spectacular practice, mobilizing Revolutionary Fear and Trust. But when looking at the wider political meaning of these practices, we see that computers were usually chosen as targets because of their symbolic value. Computer sabotage certainly validated and reinforced hostile feelings over this technology, but this was not the end point.

An important aspect to remark, is that some emotional practices I have analyzed were by individual authors, but the making of these texts was not always an individual author's endeavor. Nor this endeavor was merely intellectual. For example, Romano Alquati's writings about Olivetti resulted from his work with Olivetti's blue-collar workers. As Unni Wikan did in Bali, Alquati had to establish resonance with the workers, in order to report their experiences to the readers of *Quaderni*

1055Scheer. 217.

Rossi. In this sense, Alquati's report on Olivetti is a product of both the researcher and the workers. Other examples I have discussed relates to memory-building and legacy-building practices. As we have seen, this can cause a shift in the kind of emotional practices performed. For example, Errico Malatesta's mobilizing emotional practices against Kropotkin's determinism become regulating emotional practices in the posthumous collections of his writings. This shift is prompted by the curators of these publications, not by Malatesta: Caleffi, Zaccaria, Richards and others made a conscious choice about what to include or not. Also in this case, it was not an individual endeavor. It is how Technopolitical Resonance is established inter-generationally: every republishing of Malatesta's writings against Kropotkin re-enact the emotional practice performed by Malatesta. A particularly interesting case of legacy-building practice is the re-printing of Malatesta's anarchist program by the Italian Provos. They did so while also learning how to use the mimeograph machine: not only they mobilized the Principle of Hopeful Curiosity through Malatesta's writings, they also practiced it by learning how to use a new technological tool.

As specified in the introduction, most of the emotional practices discussed in this dissertation emerged from textual sources. Looking at emotions-as-practices also reminds that individual subjects are always a mind-body continuum, thus emotional practices also implies bodily practices. This aspect needs to be investigate through dedicated research, but some preliminary observations can be drawn. One, many of the political analysis on technological development I have analyzed (and thus their emotional practices) were the result of first-person, bodily experiences with the machines. Alquati's report was also the result of the workers' bodily experiences in Olivetti factories, their relationship with the machines they operated, their daily working schedules in the automated factory -also regulating when their bodies should feed, rest, work. Two, some practices are available through texts, but this is not how they were experienced originally. The "Padrone Olivetti" song was not meant to be read on a piece of paper, nor to be listened to while sitting still in a concert hall. This song, like other political songs, was written to be sung collectively during marches, demonstrations and political protests. Most historical actors likely experienced the song not only through its lyrics and music, but also through the proximity of other workers during collective political happenings. Political slogans like "zero work and full salary // all the production to automation" were chanted during marches and written on walls. Three, some practices contains a specific indication on how and where performers' bodies must be positioned, particularly in relation to machines. When mobilizing Revolutionary Trust and Class Hatred through sabotage, the saboteurs point at a specific bodily relationship to have with the computer: bodies must be "upon the gears," stopping them, and not beside the gears, operating them. Other examples in which the

body was central, are the protests set up by IBM labor unions, like strikes and production blocks, which mobilized Working Class Pride through workers' bodies. These bodies did not perform their assigned job (or prevented other bodies from doing so), thus showing the practical consequences of workers' unity: the possibility to change the company plans. As we have seen, IBM labor unions did not manage to organize large scale strikes at IBM Italia, yet their physical presence in the company reminded the management of this possibility.

Moving on to the consequences of these emotional practices, my investigation of Italian socialist culture shows that the concept of Technopolitical Resonance highlights intersections between technology and politics which existing frameworks do not show (in my case, Jasanoff and Kim's "Sociotechnical Imaginaries").[1056] The Italian socialists discussed here did not develop an "institutionally stabilized" vision of a desirable (or undesirable) future achievable through advancements in the computer sector. Certainly they had opinions on which computer futures were desirable or not, but their computer debates highlighted various perspectives on the political significance of this technology. The Principle of Hopeful Curiosity was powerfully amplified by many of the actors I have analyzed, but I cannot claim that this technopolitical feeling-thought was seen as *the* Sociotechnical Imaginary characterizing any of these groups: Socialist Fear of Falling Behind remained an important argument within the PCI; many social anarchists were not interested in computers; and Class Hatred hindered the quest for "the socialist use of machines" within grassroots social movements. Nor can I claim that the Principle of Hopeful Curiosity was the defining Sociotechnical Imaginary within Italian socialism at large. Here the problem is not the lack of "institutional stabilization," but the fact that Sociotechnical Imaginaries are connected with creating a political identity, and with ideas about what future society should look like. I used the term "socialism" as a unifying concept. But, as I have discussed, there were many ideological and historical divisions among Italian socialists. These divisions were fundamental for their political identity, and highlighted the different visions of "desirable futures." For example, anarchist Maria Teresa Romiti and Marxist Paola Manacorda had similar critiques of computers, and mobilized the same emotions. But Romiti was talking about "the technobureaucracy's computer," not "the Capital's computer" (stressing her anarchist identity);[1057] while Manacorda remarked that the greatest contemporary utopia was to forget society was divided into classes (stressing her Marxist identity).[1058]

1056Sheila Jasanoff and Sang-Hyun Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (University of Chicago Press, 2015).
1057Maria Teresa Romiti, "Totem Computer," *A-Rivista Anarchica*, March 1982.
1058Paola Manacorda, "Il Grande Automata," *Un'Ambigua Utopia*, 1982.

But Technopolitical Resonance also shows that the lack of a Sociotechnical Imaginary does not imply the lack of a politically meaningful reflection on the societal significance of technology. If we take emotions seriously and recognize their epistemic and performative function, it is noteworthy that different actors across the socialist spectrum mobilized and communicated the same emotions in their computer discourses. Despite not fostering a specific computer imaginary, they did foster an emotional and intellectual attitude about computers (the Principle of Hopeful Curiosity). From a political perspective, this attitude was fundamental to re-politicize computer debates and design, in a period when the Black Box Entanglement, Socialist Fear of Falling Behind, and Class Hatred fostered their de-politicization.

Finally, a reflection on the limitations of this concept. Technopolitical Resonance focuses on *publicly* performed emotional practices, we can thus observe certain ramifications. First, only focusing on publicly performed emotional practices might overshadow internal conflicts within groups and organizations. These conflicts could be relevant from a political history of technology perspective. Regarding IBM Italia and the Black Box Entanglement, it would be interesting to investigate IBM Italia management's feeling-thoughts on IBM's low R&D investments in Italy. Publicly, the Italian managers backed their head office's policy. But this does not necessarily mean they were happy about these decisions. Second, the private sphere is a crucial setting for shaping and sharing people's emotions. Technopolitical Resonance is an actor-centered perspective for examining emotions' role in the history of technology, but is not entirely suitable for producing in-depth assessments of individual actors. Researchers aiming to do so, need to carefully pinpoint how the actor's emotions are shaped, thus personal relationships and private communications should not be overlooked. Regarding the emotions mobilized by Italian actors, it would be especially interesting to discover how these emotions were transmitted through family relationships. Many families were involved in the stories presented here, and by "family" I mean a small group of people with strong emotional ties. Some were families tied by blood and marriage: Olivetti father and son, the Berlinguer brothers, the Berneri-Caleffi-Richards extended family, the Cagol-Curcio couple. Others were families by choice: the anarchist community in Ivrea, which considered asking Adriano Olivetti for a communal house; IBM labor unionists, mom IBM's rebel children; the revolutionary communists who became brothers and sisters in arms; the punx, who lived together in squatted houses and buildings in Milan. These actors' personal relationships likely had a role in the development of their technopolitical feeling-thoughts.

Notwithstanding these limitations, Technopolitical Resonance can provide crucial insights in the historical connections between emotions, technology, and politics. In the 21st century, the "Computer Age" has been re-branded the "Digital Age," a broader definition which better emphasizes the variety of technologies involved in this epochal transformation. Certainly, many things have changed. Narratives on "digital exceptionalism" are being increasingly challenged and combining the history of technology with other historiography fields has proven fruitful. From a conceptual history perspective, scholars have shown there are many continuities (and, of course, changes) between the analog and the digital age.[1059] Likewise, from a history of emotions perspective, many threads unite the 20th century "Computer Age" with the 21st century "Digital Age." Technopolitical Resonance lets us see these threads, and critically reflect on how they shaped past and present assumptions on computer technologies' political and societal significance.

2. The Black Box Entanglement in the 2000s: The software industry

From 1991, the Soviet Union's dissolution made "fear of falling behind" seem less relevant on the geopolitical level: there was no longer a well-defined, and culturally powerful "other" to fall behind. The neoliberal "no alternative," what Mark Fischer called "Capitalist Realism,"[1060] sanctioned the symbolic victory of capitalism over socialism. China has now taken the Soviet Union's place in the technological competition with the USA,[1061] but it lost its cultural appeal among US and European left-wing anti-capitalist movements. Yet, "fear of falling behind" is still being mobilized outside the military-industrial complex,[1062] often to keep computers as black-boxes. In other words, the Black Box Entanglement is still Resonant.

An example of the Black Box Entanglement's mobilization after the Cold War is "FUD": Fear, Uncertainty, and Doubt. As Bryan Pfaffenberg explains, "a FUD campaign employs a variety of techniques, including warnings to customers concerning the risks of moving to an unproven new product, a barrage of press releases designed to confuse customers concerning the merits of the new product, and benchmark tests—generally rigged in the market-dominating firm's favor—that raise

1059 Valérie Schafer et al., eds., *Digital Roots: Historicizing Media and Communication Concepts of the Digital Age* (De Gruyter, 2021).
1060 Mark Fisher, *Capitalist Realism: Is There No Alternative?* (John Hunt Publishing, 2009).
1061 Bryan Bender, "'We're Falling behind': 2022 Seen as a Pivotal Lap in the Space Race with China," *Politico*, December 31, 2021, https://www.politico.com/news/2021/12/31/2022-space-race-china-us-526271, accessed September 20, 2022.
1062 Larry Alton, "Staying Technologically Relevant Has Suddenly Become A Full-Time Responsibility," *Forbes*, October 21, 2016, https://www.forbes.com/sites/larryalton/2016/10/21/staying-technologically-relevant-has-suddenly-become-a-full-time-responsibility/, accessed September 20, 2022.

questions about the new product's performance."[1063] According to Pfaffenberg, the first instances of this fear happened already in the 1970s. From the 1990s, I argue, FUD was also used to promote black-boxed technologies.

From the 1990s, Microsoft frequently employed Fear, Uncertainty, and Doubt to discredit Free and Open Source Software (FOSS), as denounced by activists[1064] and documented in scholarship.[1065] It did this by designing software which was not compatible with GNU/Linux (even if it could be), or by not allowing FOSS programs to run on a Microsoft operating system.[1066] In the mid-2000s, Microsoft also threatened to sue GNU/Linux for patent infringements, though ultimately the issue did not go to court. These FUD tactics suggested that those using Free Software would be left behind by Microsoft because they would not be able to use Microsoft products in the future. On the one hand, this campaigning was in line with Microsoft founder Bill Gates's attitude towards hackers. In his 1976 "letter to hobbyists" he had notably denounced the free sharing of software as harmful to the software industry.[1067] But, on the other hand, the context was very different. The rationale behind the 1976 letter was a straightforward and legitimate request: Gates wanted people to stop using his software for free, because his aim was to make a profit. In the 1990s, Microsoft was one of the most successful software companies and could rely on specific legislation to protect its products. The problem with hackers was no longer that they were stealing Microsoft code, but that they showed an alternative micro-politics of computer design.

In its FUD campaigns against Free and Open Source Software, Microsoft established Technopolitical Resonance with the Cold War US military-industrial complex. Once again, the Black Box Entanglement was performed, most evidently as a mobilizing emotional practice to sell a product, but also as a regulating practice to point out the correct attitude towards computers. Prominent figures at Microsoft accused Free and Open Source Software of being a threat to the

1063Bryan Pfaffenberger. "The rhetoric of dread: Fear, uncertainty, and doubt (FUD) in information technology marketing." *Knowledge, Technology & Policy* 13, no. 3 (2000): 78-92.

1064Chris DiBona and Sam Ockman. *Open sources: Voices from the open source revolution*. (O'Reilly Media, 1999); Eric S. Raymond "Why Microsoft smears-and fears-open source." *IEEE Spectrum* 38, no. 8 (2001): 14.

1065Pfaffenberg, "The rhetoric of dread;" an example of FUD, but related to open standards: Tineke Mirjam Egyedi and Anique Hommels, "Predatory Strategies in Standards Wars: On Creating Fear, Uncertainty, and Doubt," in *Effective Standardization Management in Corporate Settings* (IGI Global, 2016), 333–51.

1066Margaret S. Elliott and Walt Scacchi, "Mobilization of Software Developers: The Free Software Movement," *Information Technology & People* 21, no. 1 (February 29, 2008): 4–33. Raymond, "Why Microsoft smears-and fears-open source."

1067Bill Gates, "Open Letter to Hobbysts," *Homebrew Computer Club Newsletter*, February 3, 1976.

American way of life,[1068] and Linux of being "communist."[1069] Poignantly, reporting on Microsoft FUD campaigns against FOSS, Open Source leader Eric Raymond compared Microsoft's language to the paranoid Cold War generals in Stanley Kubrick's film "Dr. Strangelove."[1070] The Microsoft vs. FOSS issue was more than just a business matter. Microsoft not only tried to disparage a rival, but also promote a politically informed, correct way to view computers. This vision was not invented by Microsoft. Quite the opposite, Microsoft referred to it precisely because it was already established in the United States. This narrative strongly asserted the centrality of closed and proprietary software as the building block of US social and economic order: keeping computers as black boxes preserved the American "way of life."

During the 1990s, fear of falling behind was mobilized against the Free Software Movement by an internal current, today's Open Source Movement.[1071] This was not a case of Black Box Entanglement because it did not entail a black-boxed technology. However, this fear resonated more with the "Closed World" ambitions of establishing a technologically advanced capitalist society, than with 1960s Counterculture. The notion of "Open Source" was elaborated by Free Software hackers who were displeased with the movement's outreach tactics. According to them, the notion of "Free Software" had become too politicized and was discouraging companies from even considering it. By popularizing the term "Open Source" they wanted to foster a business-friendly and pragmatically oriented narrative which could be welcoming and appealing to the computer industry. To achieve this goal, they established "The Open Source Initiative" organization and drafted the "Open Source Definition" as a complementary licensing framework to the GNU General Public License.

In a piece titled "Why Open Source misses the point of Free Software,"[1072] Richard Stallman argued that the birth of Open Source was motivated by a "fear of freedom," and its responsibilities. This is an interesting claim, but better that a philosopher scrutinizes it than I do According to the evidence I

1068Andrew Leonard, "Life, Liberty and the Pursuit of Free Software," *Salon*, February 15, 2001, https://www.salon.com/2001/02/15/unamerican/, accessed September 20, 2022.

1069Lea Graham, "MS' Ballmer: Linux Is Communism," *The Register*, July 31, 2000, https://www.theregister.com/2000/07/31/ms_ballmer_linux_is_communism/, accessed September 20, 2022.

1070Eric S. Raymond, "Why Microsoft Smears-and Fears-Open Source," *IEEE Spectrum* 38, no. 8 (2001): 14–15. Ironically, Raymond is actually a fervent anti-communist, as clearly seen from his personal blog, see for example "Gramscian Damage," *Armed and Dangerous* (blog), February 11, 2006, http://esr.ibiblio.org/?p=260, accessed September 20, 2022.

1071Christopher Tozzi, *For Fun and Profit: A History of the Free and Open Source Software Revolution* (MIT Press, 2017); Christopher M. Kelty, *Two Bits: The Cultural Significance of Free Software* (Duke University Press, 2008).

1072Richard M. Stallman, "Why 'Open Source' Misses the Point of Free Software," *Communications of the ACM* 52, no. 6 (2009): 31–33. (The most recent version is at: https://www.gnu.org/philosophy/open-source-misses-the-point.html, accessed September 20, 2022).

have analyzed, I prefer to say: Open Source was informed by the same kind of Fear of Falling Behind as the Black Box Entanglement. Eric Raymond, as we have seen, was never secretive about Open Source's aim to de-politicize the movement on the macro-political level. Yet, even though Open Source claimed to stem from the need to depoliticize Free Software, it was not an apolitical endeavor. As Kelty pointed out, the motivation behind Open Source was "a powerful (ideological) resistance to being ideological."[1073] Open Source ideology was a confirmation of faith in a free-market capitalist economy as one of the best driving forces for technological development. Shifting away from the "idealistic" narrative of Free Software was thus necessary to prevent falling behind in the business sector.

Open Source undoubtedly helped to increase the popularity of non-closed software. But it also fostered a de-politicization within the software licensing debate, and a marginalization of the Free Software arguments. Toning down the more political aspects of the Free Software narrative widened the movement's audience, and today the distinction between "Free" and "Open" seems more important for scholars than for activists or FOSS developers. Nonetheless, it is interesting to note how the Open Source "faction" explicitly sought a conflict at the political level. Presenting the Open Source movement as a de-politicized version of Free Software was not the outcome of negotiations within the larger movement: it also entailed a marginalization of Free Software by Open Source advocates, fueling the conflict between the two groups. This conflict was likely exacerbated by Eric Raymond's and Richard Stallman's personalities, both known for their controversial statements[1074] and seen as examples of contemporary geek culture's unfriendliness.[1075]

Furthermore, the Open/Free division also paved the way for the subsequent black-boxing of open source code. The Open Source Initiative crucially changed Stallman's original licensing framework, because it also accepted licensing allowing the later "proprietarization" of the former "open source" code. Whereas the GNU General Public License requires that further modification of the source code is released under a similar free/open licensing scheme, other licensing schemes do not have this clause. Google's mobile operating system Android is nowadays one of the most famous examples of this mechanism. Android is indeed based on Linux, but most distributions include proprietary software: Android's Open Source version lacks many of the apps that are useful for a

1073Kelty, *Two Bits*. 108.

1074For Raymond and Stallman's controversial declarations, see: https://en.wikipedia.org/wiki/Richard_Stallman#Resignation_from_MIT_and_FSF; https://en.wikipedia.org/wiki/Eric_S._Raymond#Political_beliefs_and_activism. Accessed September 20, 2022.

1075Joseph Reagle, "Nerd vs. Bro: Geek Privilege, Idiosyncrasy, and Triumphalism," *First Monday* 23, no. 1 (2018); "'Free as in Sexist?' Free Culture and the Gender Gap," *First Monday* 18, no. 1 (2012).

smartphone. Unless you are incredibly committed to the exclusive use of FOSS products, your Android will most likely be full of proprietary apps.[1076] This should raise questions, as an increasing amount of people experience digital technologies only (or mostly) through their smartphones: black-boxed technology is the only one they know, and also the only one possible for them, unless they change hardware.

3. The Black Box Entanglement in the 2000s: Europe's Digital Decade

In Europe, we are currently at a turning point as the European Commission is perfecting its plans for "Europe's Digital Decade."[1077] Will these plans also be informed by the Black Box Entanglement, and therefore suffer its de-politicizing effect? Or will other technopolitical feeling-thoughts become central in the "European way" to the digital revolution, fostering a re-politicization of computer debates and design?

As of January 2022, we seem to be on a good path, but there is certainly room for improvement. On the macro-political level, European Commission initial plans are comforting: the aim is to craft an "European way" to the Digital Age, based on European values.[1078] In June 2021, representatives from European Union member states signed The Lisbon Declaration, outlining principles and values which should lead the Digital Age. The document contains many promising formulations such as: "technologies should be human-centered, human-controlled, promote human well-being and human dignity," "Supporting media literacy to develop critical thinking in view of a wide choice of information and content and as a key element of active citizenship and an effective fight against disinformation," and "Promoting women's and girls' participation and leadership in the field of Science, Technology, Engineering and Mathematics by unleashing their potential in tech."[1079] However, as we shall see, these statements are ultimately part of a de-politicizing discourse on the Digital Decade's macro-politics.

1076Tozzi, *For Fun and Profit*; Richard M. Stallman, "Is Android Really Free Software?," *The Guardian*, September 19, 2011, https://www.theguardian.com/technology/2011/sep/19/android-free-software-stallman, accessed September 20, 2022.

1077European Commission, "Europe's Digital Decade: Commission Sets the Course towards a Digitally Empowered Europe by 2030," March 9, 2021, https://ec.europa.eu/commission/presscorner/detail/en/IP_21_983, accessed September 20, 2022.

1078These values are not specified.

1079"Lisbon Declaration – Digital Democracy with a Purpose," June 1, 2021, https://www.lisbondeclaration.eu/learn-more/, accessed September 20, 2022.

Europe's Digital Decade's micro-politics are still uncertain. On the hardware side, we know Europe has great ambitions to establish its own semiconductor industry. But will European Union member states be able to achieve this? And on what conditions? It is not the first time European countries have tried to unite their strengths and gain autonomy from non-European technology producers. But, similar projects have failed in the past. In the 1960s, as Elisabetta Mori discusses, West European countries tried to promote the computer sector's "Europeanization" by suggesting a collaborative computer enterprise, "Unidata."[1080] Italy was one of these countries, together with France, Germany, and the UK. They could not reach an agreement: ultimately, as Mori explains, "Paradoxically, IBM and the other U.S. firms could profit better from the European Common Market than the European firms themselves."[1081] European policymakers should study this history, as it provides important insights on what can prevent successful collaboration among countries when they embark on ambitious technological enterprises.

What about the software that will be a crucial component in the mass digitization of public services (from healthcare to education) foreseen in Europe's Digital Decades? Existing documents are sketchy, at best. The Lisbon Declaration makes generic references to "open" and "free" digital tools and infrastructures, but never explicitly mentions "Free and Open Source Software." Meanwhile, the global anti-corruption movement Transparency International has published a report on Big Tech lobbying activities in the European Parliament.[1082] The report is eloquently titled "Deep pockets, open doors," and paints a disconcerting picture of the level of spending—and thereby potential influence—that US multinational tech companies have on European Union policymakers.

As of January 2022, the European Union has not made yet a serious commitment to Free and Open Source Software. Which is odd, considering this is a much less expensive road to "technological sovereignty" than setting up semiconductor manufacturing. Not to say that these are mutually exclusive: but why not invest in both? Indeed, the European Commission "Open Source Strategy" for 2020-2023 states that Open Source software will move towards improved technological sovereignty. Yet, the report is incredibly humble compared to the lofty ambitions that a concept like "technological sovereignty" implies. The report outlines a set of principles aimed at "encouraging

1080Elisabetta Mori, "Coping With the 'American Giants,'" *IEEE Annals of the History of Computing* 41, no. 4 (2019): 83–96.
1081Mori. 93.
1082"Deep Pockets, Open Doors. Big Tech Lobbying in Brussels" (Transparency International EU, 2021), https://transparency.eu/wp-content/uploads/2021/02/Deep_pockets_open_doors_report.pdf, accessed September 20, 2022.

and leveraging"[1083] the use of Open Source Software (why not "enforcing and rewarding" for example?). The reasoning behind these principles is that "They will allow the Commission to choose non-open technologies where there are good reasons to do so, while encouraging us to plan for future open-source alternatives."[1084] This is a rather weak statement, made even weaker by the fact that Free and Open Source Software use has no added value in the "Digital Economy and Society Index" (DESI), the main tool used by European policymakers to track the progress of Europe's Digital Decade.[1085]

The Digital Economy and Society Index, as many of the documents which either informed[1086] or operationalized[1087] the European Union plans for the Digital Decade, powerfully mobilized the Black Box Entanglement, fostering a de-politicization of computer debates and design. There is no explicit commitment to ensure that the Digital Decade will not be based on black-boxed technologies. Yet, the need to accelerate the digital transition is a recurring theme in these documents. This need is motivated by the fact that digital technologies will bring tremendous opportunities to those able to seize them, yet cause societal and individual damage to those who will not be prepared for digital society (losing their job or educational opportunities etc.) These documents are Resonant with the discourses preparing the arrival of the "Computer Age" more than half a century ago: not only because the "Computer Age" and the "Digital Age" both look like a technologically advanced capitalist society, built on black-boxed technologies; but also because both ages are perennial projections. They are imagined computer futures, based on models of how things will be tomorrow, if they remain the same as yesterday. These models are used to make great claims about the benefits of maintaining the status quo, and the dangers of seeking a different path. The burden of proof is always left to history, although historiography is never consulted when it is time to start imagining the new "technological age."

4. Histories that are not over. Re-politicizing Europe's Digital Decade

1083 European Commission, "Open Source Software Strategy 2020-2023," October 21, 2020, https://ec.europa.eu/info/sites/default/files/en_ec_open_source_strategy_2020-2023.pdf.
1084 European Commission, "Open Source Strategy." 10.
1085 European Commission, "Digital Economy and Society Index (DESI) 2021. Methodological Note," 2021.
1086 McKinsey & Company, "The Digital Transformation in Europe" (European Commission, September 2020), https://digital-strategy.ec.europa.eu/en/news/commission-publishes-analysis-macro-economic-potential-digital-transformation-independent, accessed September 20, 2022.
1087 European Commission, "Proposal for a DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Establishing the 2030 Policy Programme 'Path to the Digital Decade,'" September 15, 2021, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0574, accessed September 20, 2022.

But, luckily for my reader, this is a dissertation on the History of Technology. The research I have conducted in recent years shows it is no surprise that Italy scores quite low on the European Union Digital Economy and Society Index (DESI). But my research also shows its low DESI score should not imply that Italy is "falling behind" in computing history. Neither the Italian government nor the private sector invested in the development and use of computer technologies. In this sense, there is certainly an institutional and entrepreneurial gap which needs to be addressed. But *how* this gap is addressed, and *why* it should be addressed, are different questions. They are political questions that Italians have been discussing for decades.

Given the problematic assumptions with DESI, what if Italy's low score is not entirely a negative aspect? What if DESI is more useful for illustrating that the Black Box Entanglement was not a particularly Resonant feeling-thought in Italy, rather than measuring the country's achievement in the computer age? I illustrate this point by critically assessing Italy's score on the 2021 DESI.[1088] The Index uses four main indicators: 1) "Human Capital," measuring the population's basic and advanced tech-skills; 2) "Connectivity," measuring the availability and quality of Internet connection across the country; 3) "Integration of digital technology," measuring the private sector's use of digital technologies; 4) "Digital public services," measuring the digitization of the public sector. I do not address (2) because this is an infrastructure issue, in which I am not competent but recognize the importance of intervention. The other indicators have crucial societal and political implications which transcend the technical realm.

Human Capital is the indicator where Italy scores the lowest from a transnational perspective (25th out of 27 countries). The main reasons for this score are the low number of Information and Communication Technology (ICT) graduates, and the population's low-level digital skills. Surprisingly, the gender disparity among ICT professionals is not significantly lower than the European average (Italy 16%, Europe 19%). The use of digital technologies in the private sector is going well according to DESI: Italy scores 10th in Europe. The good ranking is partly thanks to legally enforced electronic invoices, which are used by 95% of Italian enterprises (EU average is 32%). Overall, Italy is close to the European average for most sub-indicators. The lowest scores are in the use of Big Data, Artificial Intelligence, ICT for environmental sustainability, and online commerce. On the use of digital technologies in the public sector, Italy is a little below the

1088European Commission, "Digital Economy and Society Index (DESI) 2021. Italy," 2021, https://digital-strategy.ec.europa.eu/en/policies/countries-digitisation-performance, accessed September 20, 2022.

European average, but not dramatically. However, the number of citizens using e-Government services is significantly lower: 36% in Italy, against the European average of 64%.

Looking at these data, we can clearly see what needs to be done: improve the population's digital skills and the number of ICT graduates, so that more enterprises will use Big Data and Artificial Intelligence, as well as ICT solutions for sustainability, and more people will be buying and selling online. Furthermore, improving the population's digital skills means that more people will use eGovernment services (which Italy is already doing well to provide). In other words: we need more people to learn technology so they can use more technology. This further translates as: we need more technology. Why? To achieve the "Age of Technology." And once we are there, what will become of us? How is the new "Digital Age" different from the old "Computer Age"? Where is the human-centered aspect, if countries are rewarded with a good score for the mere fact that they are using more technology? Who is the "sovereign" here, and of what? Where is the "European path" to the Digital Decade?

A famous quote by Antonio Gramsci reads: "The crisis consists precisely in the fact that the old is dying and the new cannot be born; in this interregnum a great variety of morbid symptoms appear." Usually, this sentence is quoted to point out something "old" which should be archived for good, while something "new" should emerge. The European Commission could certainly use this sentence to support its Digital Decade aims and the need to accelerate the digital transition. But what if the problem is not "the new" which cannot emerge? What if "the old" was actually fine, and should not die?

It seems that the European Commission was on a good path 30 years ago, better than now, in terms of providing an alternative to the Black Box Entanglement. And not just the European Commission: many policymakers, activists, and citizens across Europe have been discussing and experimenting with different macro-politics and micro-politics of computing in recent decades. Perhaps Europe's Digital Decade should start there, not from a de-politicized projection of the Digital Age, which is much more Resonant with the Black Box Entanglement than the Lisbon Declaration's aims. And, if the level of re-politicizing computer design and debates was considered an indicator for the Digital Decade, Italy might actually have a high score.

As seen through this dissertation, Italy's re-politicization of computer debates and design had something to do with the Principle of Hopeful Curiosity. This re-politicization was not a linear

development in Italy. But Technopolitical Resonance is a phenomenon that can start at any time and place, whenever a technopolitical feeling-thought is publicly performed. The specific technopolitical configurations available to actors always change through time. But there is a continuity in the feeling-thoughts that actors employ to make sense of these configurations. The fact that a technopolitical feeling-thought fails to produce large scale engagement, might be a sign that it was not "credible" enough for the technopolitical configuration at the time. But it does not mean that the feeling-thought was "irrational" or "too emotional" or otherwise inappropriate. The fact that a technopolitical feeling-thought, such as the Principle of Hopeful Curiosity, is continually performed shows that this feeling-thought exists: it provides information about people's "computer attitudes" which should not be "improved" or "fixed," but addressed as legitimate and valid perspectives. Especially if the ambition is to craft a "human centered" Digital Age, inspired by "democratic values." And, if we take these feeling-thoughts seriously, we might learn how to build a path to the Digital Age beyond the Black Box Entanglement. Italy's history of computing has some insights.

5. Re-politicizing a computer, in theory and practice. Lessons from Italy's history of computing

The history of Italian manufacturer Olivetti shows that "promoting democratic values" is a culturally and historically sensitive topic, and the meaning of these "democratic values" might differ even within two computer companies in the former Western Bloc. Adriano Olivetti and Thomas Watson (Senior and Junior) had many feeling-thoughts in common. They are remembered for their paternalism, and Adriano Olivetti's liberal socialism was not so distant from the Watsons' welfare capitalism. Certainly, they all disliked the unions. However, there is a crucial difference between IBM and Olivetti's corporate culture. Although progressive, the Watsons' welfare capitalism was still oriented towards "the elimination of socialist sentiment" among the workers.[1089] On the other hand, Adriano Olivetti hired social anarchist Carlo Doglio, and many other left-wing politicized intellectuals.

This difference was particularly important in the Italian context, where "socialist sentiments" were not frowned upon like in the USA. Olivetti was more familiar in Italian culture, and with the country's meaning of "democracy": this established some form of Resonance among Olivetti

1089Thomas Haigh, "Computing the American Way: Contextualizing the Early US Computer Industry," *IEEE Annals of the History of Computing* 32, no. 2 (2010): 8–20.

employees, even if they did not fully share Adriano Olivetti's political vision. For some time, the Olivetti company was a place where politics was discussed alongside computers, and where diverse political visions co-existed and interacted. IBM Italia also hired left-wing workers. But whereas politicized Olivetti workers spoke well of the company, the same cannot be said of IBM's (at least those who spoke publicly about the company). Both companies' workers helped re-politicize computer debates in Italy. But Olivetti workers did it by exploring "the socialist use of machines," while IBM Italia workers criticized the "capitalist use of machines." Being able to say freely "I do not like IBM" is a fundamental democratic principle, but this is only the tip of the iceberg: a fundamental part of democracy is participation, being able to contribute to the common good not only by saying "I don't like this" but also "I like that."

Moving from hardware to software, from the late 1990s, European Union legislators became increasingly interested in the use of Free and Open Source Software. Italy is one of the European countries where this interest was particularly visible in Public Administration.[1090] The Italian Communist Party's legacy played a role. From the early 2000s, the Italian parliament discussed using FOSS in public administration. This was initially under the parallel input of Fiorello Cortiana, a Green Party senator, and Pietro Folena, former secretary of the Italian Communist Youth Federation (Federazione Giovanile Comunisti Italiani, FGCI).[1091] Their work led to the establishment of a government committee, headed by Angelo Raffaele Meo, professor at Turin Polytechnic and long-time expert in the use of Information Technologies in public administration.[1092] The committee published an official recommendation favoring FOSS.

In the 2000s, several articles, books, and conferences enthusiastically discussed the advantages of FOSS for public administration. The outcome at State level was modest, confirming the Italian government's chronic inability to seriously address technological development. On the regional level, however, where things moved faster than in parliament, many administrations implemented FOSS recommendations. The regions Tuscany and Emilia-Romagna, administered for years by the Italian Communist Party, had a pioneering role in creating local legislation to encourage the use of FOSS in public administration.[1093] CSI-Piemonte (ICT services provider in the Piedmont region),

1090See: Flavia Marzano and Angelo M. Buongiovanni, "Storia Dell'Open Source Nella Pubblica Amministrazione Italiana," *Informatica e Diritto* 17, no. 1–2 (2008): 377–88; The main Italian FLOSS initiatives from 2000-2009 are reviewed in: James A. Lewis, "Government Open Source Policies" (Center for Strategic and International Studies, 2008).

1091Marzano and Buongiovanni, "Storia Dell'Open Source."

1092Angelo Raffaele Meo, "Informatica e Pubblica Amministrazione" (Informatizzazione della Pubblica Amministrazione, Rome, 1980).

1093Marzano and Buongiovanni, "Storia Dell'Open Source." 403.

established through the input of Italian Communist Party administrators in the 1970s, developed its own FOSS software, aiming to foster exchanges with the existing FOSS community.[1094] In 2012, the Italian government "recommendation" to use FOSS software when possible was changed to the "obligation" to use FOSS software, unless technically impossible. This happened through decree "Crescita 2.0" (Growth 2.0) from the "technocratic government" led by Mario Monti.[1095] However, the specific guidelines on how to apply the decree were not published until 2018.

Today, Free and Open Source Software still features in Italian debates on public administration reform, although less than in the past. Creating effective legislation to ensure the public sector's early adoption of FOSS suffered many delays. These left the door open for software multinational corporations, favoring lock-ins into proprietary software, either because of commercial agreements or employees' habits.[1096] The Covid-19 pandemic has dramatically accelerated this shift away from FOSS, particularly in one of the public sector's most sensitive areas, namely education.[1097] Yet, alternatives to Big Tech have existed for years: to improve the population's digital skills, this learning can include how to use FOSS platforms like *Jitsi* or *BigBlueButton* instead of the ones provided by GAFAM.[1098] Italy has been on a slow yet righteous path. It would be a pity if the European Digital Decade halted, rather than learned from this.

Moving outside institutional politics, and inside grassroots politics, Italy became an important link in the network of European digital countercultures, proving once again its role in the re-politicization of the European "Computer Age." In the 1990s, a left-wing hacker culture emerged, fueled by Italian activists' encounters with other European experiences, such as the German Chaos Computer Club and the Dutch Galactic Hacker Party.[1099] Hacker culture and FOSS thereby encountered the century-old Italian socialist tradition, providing the "credible, socialist use of machines" discussed in previous decades. A significant example of how Italian socialists have improved their technological skills, while remaining grounded in their history and values, is the

1094Marzano and Buongiovanni. 405.

1095"Ulteriori misure urgenti per la crescita del Paese," Decree Law no. 179 (2012). Then: "Ulteriori Misure Urgenti per La Crescita Del Paese," Public Law no. 221 (2012). Sergio Contessa, "L'innovazione Tecnologica Nella PA: L'Agenda Digitale Italiana Dal Governo Monti al Governo Renzi Passando per Il Governo Letta," *Amministrativ@ Mente-Rivista Di Ateneo Dell'Università Degli Studi Di Roma "Foro Italico,"* no. 5–6 (2014).

1096Andrea Glorioso, ed., *Il software libero in Italia* (Milano: ShaKe, 2009).

1097Paolo Monella, "Istruzione e GAFAM: Dalla Coscienza Alla Responsabilità," *Umanistica Digitale*, no. 11 (2021): 27–45; Maria Chiara Pievatolo, "Teledidattica: Proprietaria e Privata o Libera e Pubblica?," *ROARS - Return On Academic Research and School*, June 8, 2020, https://www.roars.it/online/teledidattica-proprietaria-e-privata-o-libera-e-pubblica/, accessed September 20, 2022.

1098Google, Amazon, Facebook, Apple, Microsoft (GAFAM also refers to Big Tech companies in general).

1099Gerard Alberts and Ruth Oldenziel, *Hacking Europe: From Computer Cultures to Demoscenes* (Springer, 2014).

online “Map of fascist assaults.”[1100] This is one of the few websites still active in the European Counter Network domain. It provides a carefully maintained list of assaults by neo-fascist groups in Italy—incredibly, still a reality in 21st century Europe.

But there are also positive examples of digital countercultures combining with the Italian socialist tradition. I feel-think Errico Malatesta would be pleased to see that *Umanitá Nova*, the magazine he co-founded in 1920, is not only still surviving a century later, but was also one of the first Italian political periodicals to have a website, hosted on a European Counter Network server.[1101] On the other hand, Antonio Gramsci’s *l’Unitá* was rescued from oblivion by hackers. The Democratic Party, metaphorical “heir” of the Communist Party and legal owner of its material heritage, sold the magazine to a private investor in 2017.[1102] Shortly afterwards, the new owner removed the *l’Unitá* website from the World Wide Web, together with its full archive, a precious historical resource that had been digitized years before and was publicly available until then. Some people, who can be called hackers “but in the most noble meaning of the term” as they specify,[1103] downloaded a copy of the archive and made it available again to the public, first through the Tor network only,[1104] then on the World Wide Web. Today the archive is also accessible through institutional library networks.[1105] But the hacker’s flair for irony remains: “*l’Unitá*. Which once upon a time was communist,” the website heading reads.

Hackers played an important role in re-politicizing computer debates and design on the national and international level. The European hacking circuits signifies a very successful example of European integration and exchange based on technology skill-sharing and tinkering. European politicized hackers also published two edited volumes on “Technological Sovereignty” before the term became common currency in European Commission policymaking documents.[1106] European hackers are quite clear about what the term Sovereignty means for them, and how to achieve it. “Sovereignty” is

1100Isole nella Rete - ECN, “Mappa Delle Aggressioni Fasciste,” http://www.ecn.org/antifa/, accessed September 20, 2022.

1101See: http://www.ecn.org/uenne/archivio.html, accessed September 20, 2022.

1102After the Communist Party dissolved, *l’Unitá* was owned by Partito Democratico della Sinistra, later Partito Democratico. After sales slumped, the magazine was sold to repay debts.

1103See: https://archiviounita.noblogs.org/, accessed September 20, 2022.

1104Tor (The Onion Router) is software for anonymous online communications.

1105Redazione, “L’archivio Storico de l’Unità,” *Bibliomediablog. Il Blog Delle Biblioteche Digitali Italiane* (blog), April 2, 2019, https://bibliomediablog.wordpress.com/2019/04/02/larchivio-storico-de-lunita/, accessed September 20, 2022..

1106Alex Hache, ed., *Soberanía Tecnológica*, vol. 1 (Calafou, 2014), vol. 2 (Descontrol, 2017). See: Lonneke van der Velden, “Constructing Technological Sovereignty,” *DATACTIVE* (research blog), April 4, 2019, https://data-activism.net/2019/04/constructing-technological-sovereignty/; The first volume is available in Spanish, French and Italian: https://sobtec.gitbooks.io/sobtec1/content/; the second volume is available in Spanish, French, Italian, English and Dutch: https://sobtec.gitbooks.io/sobtec2/content/. Accessed September 20, 2022.

taken from the Food Sovereignty movement, and its "Technological" version is based on concepts like individual autonomy, decentralized power, solidarity, human-centered technological development, ecology, and sustainability. The concepts Technological and Food Sovereignty discussed by European hackers and social movements from the Global South, might contain important insights on what European policymakers call "Digital Transition" and "Green Transition."

Beside suggesting an alternative path to the Digital Age, the histories discussed here interestingly challenge entrenched assumptions on the relationship between technology, emotions, and politics: firstly, again, that notions like "computerphobia" or "computer anxiety," crafted by 1970s and 1980s behavioral scientists, say very little about people's level of engagement with technology. Many members of the Italian Communist Party and grassroots left could be categorized as "computerphobic" or "computer anxious," yet they engaged significantly with computers. The second is a misconception by historical actors. During the 1970s and 1980s, the Communist Party accused the grassroots left of being "catastrophist," who in turn accused the Communist Party of fostering a Soviet-style, deterministic vision of technological development. None of these accusations was entirely true about computers: in the mid-1970s, the Communist Party was actually the socialist group which mostly fostered a re-politicization of computer debates, and also criticized Soviet Union's technological determinism. And the grassroots left was not "catastrophist" about computers. The discourses with the most "catastrophist" tones were often about increased workplace automation, and the critique's target was "the master," not the computer. Furthermore, many activists were just uninterested in technological development. When the grassroots left finally found a "credible" use for computers, they did engage with them, powerfully re-politicizing this technology.

The history of the "armed party" shows that, also in their case, technology was perceived as dangerous but was not a significant theme of interest. Their discourses on technological development focused on the macro-political level, thereby missing important micro-political aspects. They did not foster a re-politicization of computer design, nor make technology one of their prime targets (neither physical nor intellectual attacks): In a way, technology remained an unresolved theme of debate. For example, whereas the book *L'Ape e il Comunista* (The Bee and the Communist*)* by Red Brigades "political prisoners" presented a very negative and dichotomic perspective on computers, other sections of the armed party produced a different analysis. "Colonna Walter Alasia," which split from the main Red Brigades group in 1980, presented a document that repeated "no technological investment shall pass if it raises productivity and exploitation, it shall

pass only if diminishes the strain of labor."[1107] This was both a positive and a negative statement on technology. In the same document, they specified not wanting to "make a crusade against the computer,"[1108] but only to negotiate how, and for what purpose, such technologies were implemented. Renato Curcio, Red Brigades co-founder and *L'Ape e il Comunista* co-author, is an editor and essayist today, having written several books about the societal and political implications of digital technologies. His analyses are still very much centered on macro-political aspects, yet admittedly Curcio continues investigating technological development's political significance.

The history of the "armed party" raises one more important aspect, which could be considered by policymakers and activists shaping the Digital Age: There is every good reason, and no good reason, to be concerned about the increasing role of technology in States' repressive functions. "Every good reason" because the rule of law was often forgotten in the Italian State's handling of the armed party.[1109] Without taking the spotlight off the bloodshed and lives destroyed by the armed party: whatever reason they gave for their "war," their actions are inexcusable. But innocents' lives were broken on both sides. The Italian State deployed its full repressive force against the "revolutionary left," with consequences for many people who were not involved in the armed party. Moreover, Italian prison regimes to which many armed party members were subjected,[1110] often raised concerns from international observers and scholars. Therefore, knowing how States already abuse their power with the technology they have today,[1111] it is certainly "rational" to fear, and therefore keep in check, the technology they will have tomorrow.

At the same time, there is "no good reason" to *only* see the repressive potential of technological development. Historically, computers have been used for everything and its contrary. And their

1107"Nessun investimento tecnologico deve passare per aumentare la produttivitá e lo sfruttamento, ma solo per diminuire la fatica" Brigate Rosse - Colonna Walter Alasia, "Rivendicazione Degli Attentati Mortali Contro Renato Briano e Manfredo Mazzanti (December 1980)," in *Le Parole Scritte* (Sensibili alle Foglie, 1996). 399.

1108"Quando parliamo di tecnologia non vogliamo fare una crociata contro I calcolatori di processo ai forni, per esempio." "Calcolatori di processo ai forni" were computers that improved the performance of steel production furnaces. Brigate Rosse - Colonna Walter Alasia. 405.

1109Massimo Donini, "Diritto Penale Di Lotta. Ciò Che Il Dibattito Sul Diritto Penale Del Nemico Non Deve Limitarsi Ad Esorcizzare," *Studi Sulla Questione Criminale* 2, no. 5 (2007); Franco Bricola, "Forme Di Tutela 'Ante Delictum' e Profili Costituzionali Della Prevenzione," in *Le Misure Di Prevenzione* (Giapichelli, 1975); Luigi Ferrajoli, "Delitto Politico, Ragion Di Stato e Stato Di Diritto," in *Il Delitto Politico Dalla Fine Dell'Ottocento Ai Giorni Nostri* (Sapere 2000, 1984), 49–65; Lorenzo De Sabbata, "Mordi e Fuggi. Breve Storia Della Lotta Armata in Italia," in *Visto Censura. Lettere Di Prigionieri Politici in Italia (1975-1986)* (Bbebert Edizioni, 2017), 13–48.

1110Simone Santorso, "Lotta Armata e Repressione: Dagli Speciali Alla Dissociazione," in *Visto Censura. Lettere Di Prigionieri Politici in Italia (1975-1986)* (Bébert Edizioni, 2017), 49–64.

1111Giulia Fabini and Alvise Sbraccia, "Criminal Policies in Action: Italian Police Forces, Discretionary Powers, and Selective Law Enforcement," in *Global Perspectives in Policing and Law Enforcement* (Lexington Books, 2021); Rocco De Biasi, "The Policing of Hooliganism in Italy" (European University Institute, 1997); Xenia Chiaramonte, *Governare Il Conflitto: La Criminalizzazione Del Movimento No Tav* (Mimesis, 2019).

potential has been magnified beyond reality: often, the most worrisome aspect of the Italian State's computer investments was the waste of public resources, rather than the increased control over the population. And, when looking again at State repression, the judicial and police apparatus set up by the Italian government during the 1970s and 1980s was much scarier than any computer the State owned. Which brings us back to the question: on what "democratic values" should the European way to the Digital Age be based.

Sometimes the most effective way to prepare for the apocalypse is to joke about it: "The emperor has no clothes" reminded the Italian counterculture's magazine *Re Nudo* -and the same is true for the technocrat. As we have seen, mobilizing amusement was a powerful re-politicizing emotional practice, which helped to counter the Black Box Entanglement's Technopolitical Resonance. Fun also had a pedagogic function: sometimes, mobilizing amusement illustrated technical aspects of computers. When Napoleone Colajanni from the Italian Communist Party made fun of IBM vendors, he did not say they wore boring gray suits, but that they were selling a magnificent scientific product as if it was a cheap fashion item. By mobilizing amusement, Colajanni was highlighting the technological potential, thereby mobilizing Scientific Curiosity.

6. Beyond the Black Box Entanglement: from imagined computer futures to real technopolitical feeling-thought

It is now therefore possible to outline the first set of guidelines for new Digital Decade indicators. These guidelines consider Italy's history of computing, particularly its successes (and failures) in shaping a path to the Computer Age beyond the Black Box Entanglement. This path is worthwhile because it aims to foster a re-politicization of computer debates and design. The technological decisions that Europe makes will have a profound impact on its citizens' lives. Most European countries are democracies *de jure*, and usually also *de facto*, but the history of these democracies has many shades. The exact nature and meaning of the "democratic values" informing the European way to the Digital Age will probably be defined "in the making." This process should take into account all the different democratic paths, values, and concerns which shaped European history. And this can only happen if the macro and micro-politics of the Digital Age are not taken for granted.

1) Free and Open Source Software is a road towards technological sovereignty and one worth "not falling behind": the use of FOSS should not merely be "encouraged;" Europe should invest

substantially in it. FOSS is not only a matter of saving costs: it is also a matter of privacy, because it offers greater transparency in the functioning of the technologies used to process and store data on millions of European citizens.

2) It is important to reward the choice of not using a technology that is useless for actors, otherwise the Digital Age will be a waste of public resources. Instead of asking "how many enterprises use AI," perhaps the question should be "how many enterprises can benefit from AI?" To be asked not rhetorically, but as a question which also considers "how many enterprises want to use AI?" Furthermore, measuring the use of ICT for sustainability while not measuring ICT's sustainability, might not only waste public resources, but also lead to environmental damage.

3) The same principle should apply to individual choices in general. It is certainly positive that governments offer a variety of digital services. But for several reasons, people might prefer a human interface: this could range from fulfilling a module to wanting to see a doctor. These choices should be respected, if the Digital Age aims to be human-centered.

In short: there is a century-old, transnational "community of criticism"[1112] which has questioned what it means to develop a "digital democracy with a purpose,"[1113] spanning 20th century engineers to 21st century hackers, and including policymakers, intellectuals, activists, and researchers. Maybe it is time for a bold choice: their accumulated knowledge should be fast-tracked over the models of imagined computer futures produced by a much narrower set of actors. The Lisbon Declaration summary says that the European Digital Decade's goal is: "Promoting digital international cooperation and multi-stakeholder approaches by joining the efforts of governments, public administration, enterprises, NGOs, academia, and citizens."[1114] The order the actors involved in the Digital Decade are listed is quite telling of who the drivers will be, according to the European Commission: governing bodies and the business sector are given priority. But what if we change this order? What if we start with citizens, then academia, and NGOs, and finally move to enterprises, public administration, governments?

This brings me to my last point: women's role in the Digital Decade. Women account for half of the population. They provide an interesting case of what it means to change the perspective from a

1112Zachary Loeb, "The Lamp and the Lighthouse: Joseph Weizenbaum, Contextualizing the Critic," *Interdisciplinary Science Reviews* 46, no. 1–2 (2021): 19–35.
1113"Lisbon Declaration – Digital Democracy with a Purpose."
1114Idem.

Digital Decade driven by "government, public administration, enterprise," to one driven by "citizens, academia, NGOs." The first option is mostly represented in European Commission documents.

The European Commission's aim is to increase women's presence in the STEM[1115] sector. This is certainly a goal that I share. I have co-organized workshops, events, and conferences on this theme, before and during my PhD studies. However, so far, women's role in Europe's Digital Decade is merely to fill a (projected) job shortage in the STEM industry, and to add "diversity" to this industry. This increased diversity will be "good for company performance, business and economic progress."[1116] This is not problematic in absolute terms: women's participation in the European economy should certainly be encouraged. But the problem is, this is the *main* role so far envisioned for women in the Digital Decade.[1117] The economy is of central importance in the Europe Digital Decade documents, but their horizon is much broader. In this sense, it is reductive to see women's role in the Digital Decade as only, or primarily economic actors.

European policymakers are committing the same mistake as 1970s Italian Communist Party members: they only see "some" women. Which means, only the women who easily fit into policymakers' categories of "who" is important for the Digital Age. Italian Communists only saw women as "workers," completely forgetting housewives, who represented a large share of Italy's population of women. Today, European policymakers are only seeing women as "STEM workers," completely forgetting that many women are engaged in technology. Only, these *other* women do not always fit inside their (black?) box.

What could it mean, then, to focus on "citizens, academia, NGOs" as drivers of Europe's Digital Decade? If we take a last look at Italy's history of computing, we see the debates on "time" and "technology" by 1980s socialist women: these are an example of how citizens, academia, and NGOs (in this case, feminist and women's organizations) can be drivers of innovation. I would like to add a more recent, and perhaps more successful, example. In the early 1990s, feminist organization "Associazione Orlando"[1118] from Bologna obtained European Union funding to set up a

1115Science, Technology, Engineering, Mathematics.

1116European Commission, "Women in Digital," September 18, 2019, https://digital-strategy.ec.europa.eu/en/library/women-digital, accessed September 20, 2022.

1117On women and technology in education, see: European Commission, "Digital Education Action Plan – Action 13," September 2020, https://education.ec.europa.eu/focus-topics/digital-education/digital-education-action-plan/action-13, accessed September 20, 2022.

1118"Associazione Orlando," founded in Bologna in 1982, is one of the longer lasting and important feminist organizations with an institutional connection in the city. Today it manages the cultural center "Centro delle donne"

self-managed web services provider, called “Server Donne” (Women’s Server).[1119] The machines were switched on in 1996, and functioned until 2020, providing one of the first virtual spaces where Italian feminists could meet and share their projects. Besides providing various web-based services such as email and websites, the women managing Server Donne organized workshops and other offline, public activities centered on technology and women. Server Donne was one of the first projects of this kind in Italy, and also in Europe.[1120]

The Server Donne story can be framed within the history of early Italian digital network experiments. Server Donne also intersected with the development of the Bologna urban network Iperbole,[1121] and exchanges took place between the two groups. The city of Bologna, as seen with the example of Radio Alice, was a fundamental site for re-politicizing communication technologies. Paolo Bory observed that the imaginary informing Radio Alice and the Bologna network Iperbole “is deeply rooted in political and cultural programs that have always conceived technology more as an *instrument* than as a *cause* of change.”[1122] The same, I argue, could be said of Server Donne.

One of the most interesting Server Donne projects, showing what it means to conceive technology as an *instrument* of change, was the search engine “Cercatrice” (woman searcher). The project aimed to give search engines a woman-centered and feminist design. This entailed changing the taxonomy on which the search engine worked, by giving greater visibility to search results connected to women’s organizations and feminist culture. The technology “search engine” is not seen as a *cause* of change, but as an *instrument* to realize a feminist transformation. Server Donne founder Marzia Vaccari explained, “If I look up the word ‘violence’ on Google, I get results from many different fields: journalistic accounts, Wikipedia definitions, websites on violence to women and high school bullyism. If I write the same word on Cercatrice, there are results like: anti-violence centers, sexism, women’s movement.”[1123]

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and the library “Biblioteca delle donne,” focusing on women’s and gender studies. The name is a tribute to Virginia Woolf’s book *Orlando*.

1119 Andrea Hajek, “Women’s Studies 2.0. Italian Feminist Scholarship in the Digital Age,” *Women’s History Review* 26, no. 5 (2017): 692–704.

1120 Elke Zobl and Ricarda Drüeke, eds., *Feminist Media: Participatory Spaces, Networks and Cultural Citizenship* (Transcript Verlag, 2012).

1121 Associazione Orlando, “Women.It: Chi Siamo,” https://women.it/cosa-facciamo/, accessed September 20, 2022. On Iperbole, see: Paolo Bory, “The Italian Network Hopes: Rise and Fall of the Socrate and Iperbole Projects in the Mid-1990s,” *Internet Histories* 3, no. 2 (April 3, 2019): 105–22.

1122 Bory. 106 (Italics in original text).

1123 “Un esempio? Se cerco «violenza» su Google, trovo una serie di risultati in diversi ambiti: notizie di cronaca, la definizione su Wikipedia, siti sulla violenza contro le donne e sul bullismo a scuola. Se digitavo la stessa parola nella maschera della Cercatrice, comparivano suggerimenti quali: centri antiviolenza, sessismo, movimento delle donne.” Marzia Vaccaro, “No More?” *Almagulp* (blog), February 2, 2019, https://www.almagulp.it/sputiamo-su-google/02/2019/, accessed September 20, 2022.

Referencing the iconic Italian feminist book *Sputiamo su Hegel* (Let's Spit on Hegel),[1124] by feminist philosopher Carla Lonzi, Vaccari described Cercatrice as a "techno-feminist modern practice" whose catchphrase could be "*Let's Spit on Google.*" This spitting exercise is essentially a call to recognize women's epistemic diversity, informed by the Second Wave "Feminism of Difference." Today, the Second Wave has been joined by a Third. This Third Wave is more loosely defined than Second and First Wave feminism,[1125] but shares a commitment to challenge dichotomic assumptions of who and what "is" a woman, and "how" women can be empowered. This also entails challenging some of the assumptions which informed the previous feminist waves. Retracing the history of feminist thought and practices is beyond the scope of this dissertation. To cut a long story short: The reason why feminists wanted to spit on Hegel, and then they also wanted to spit on Carla Lonzi,[1126] and finally on Google, is that feminism does not equate empowerment with "having power." Empowerment is certainly about power, but it is mostly about choice. Those who want to "empower" women, must "prioritize our freedom to control our bodies and our lives."[1127]

This is something that European policymakers (and anyone involved in policy making, perhaps any person in general) should bear in mind, even if they are not self-identified feminists. The problem with "diversity" in the Digital Age is twofold: firstly, not enough women enroll in STEM faculties and pursue STEM careers; furthermore, other sources of knowledge about technology, in which women are much more regularly present, are consistently undervalued, discarded, and marginalized in Digital Age policy documents. Which is to say: policymakers should not only "empower" women by encouraging them to choose a STEM career. They should also pay more attention to women who have already decided to be involved with technology, even if it is from an unexpected angle: this means empowering women according to their own choices.

Feminism and gender studies are certainly knowledge fields that policymakers should consider more. If European decision making should be based on know-how, then feminist literature is a vast

1124Carla Lonzi, *Sputiamo Su Hegel, La Donna Clitoridea e La Donna Vaginale e Altri Scritti* (Scritti di Rivolta Femminile, 1974).

1125Intersectionality is one of the main currents of Third Wave feminism, and it underlines how multiple forms of oppression are always interrelated, but there are also other, such as Queer feminism, Transfeminism, Eco-Feminism.

1126The "women change times" initiative, born within second wave's "feminism of difference," would be later criticized by third wave's intersectional feminists. See, for example: Eretica, "Cronache Postpsichiatriche: Anni '80, Il Pci, La Questione Di Genere," *Abbatto i Muri* (blog), March 16, 2022, https://abbattoimuri.wordpress.com/2022/03/16/cronache-postpsichiatriche-anni-80-il-pci-la-questione-di-genere/, accessed September 20, 2022.

1127Rebecca Walker, "Becoming the Third Wave," *Ms*, January 1992.

and rich source of women's expertise. You do not need to agree with feminist theoretical framing in order to appreciate and use the empirical knowledge base provided by feminist scholarship. Furthermore, there are works focusing on technology and *feminist practices*, rather than feminist theory, which can appeal more to those who do not fancy academic feminist jargon.[1128]

But there is more than feminist literature and gender studies. Many women scholars have produced compelling and authoritative analyses on the political and societal implications of computer technologies, from Shoshana Zuboff and her *Surveillance Capitalism*, to Morgan Ames's *The Charisma Machine.*[1129] Zuboff raises important concerns which require bold and urgent policymaking, yet this is not happening. Ames thoroughly analyzes the illusions and delusions surrounding the famous "One laptop per child initiative," providing crucial insights on the waste of money and good intentions in the field of "educational technologies." Similar promises by those stimulating the initiative also stimulate current European policy documents on educational technologies.[1130] These two books raise many relevant questions for Europe's Digital Decade. Yet, sometimes Elon Musk's Twitter nonsense seems more influential in policy documents than the arguments carefully researched by Zuboff and Ames. Fostering "diversity" should not just mean training more women and girls in STEM so they can become the next egotistical tech leaders. It should also mean taking into account all the different forms of knowledge about technology produced by women, starting from the abundant literature which already exists.

To craft a truly "democratic" and "human centered" Digital Decade, I agree with Daryl Cressman arguing for the centrality of a "dialectical philosophy of technology." This would require us to stop asking "how" current technology works in a certain way, and start focusing on "*why* we have the technologies we do."[1131] And therefore, I add, shift our focus from asking "how technology will improve our society?" to "why?" it will do so, and why this is best achieved through technology, not through something else. This shift from the "how" to the "why" should not be seen as a

1128Ellen K. Foster, "Claims of Equity and Expertise: Feminist Interventions in the Design of DIY Communities and Cultures," *Design Issues* 35, no. 4 (2019): 33–41; Sophie Toupin, "Feminist Hackerspaces: The Synthesis of Feminist and Hacker Cultures," *Journal of Peer Production* 5, no. 2014 (2014): 1–11; Hannah Zeavin. ""This is Womenspace": USENET and the Fight for a Digital Backroom, 1983–86." *Technology and Culture* 63, no. 3 (2022): 634-664.

1129Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power.* (Profile Books, 2019); Morgan G. Ames, *The Charisma Machine: The Life, Death, and Legacy of One Laptop per Child* (MIT Press, 2019).

1130European Commission, "Digital Education Action Plan (2021-2027)," September 2020, https://education.ec.europa.eu/focus-topics/digital/education-action-plan, accessed September 20, 2022..

1131Cressman observes and I know, that historians already focus on this aspect. Daryl Cressman, "Contingency and Potential: Reconsidering a Dialectical Philosophy of Technology," *Techné: Research in Philosophy and Technology*, 2020.

"politicized" endeavor, but as a "re-politicizing" commitment. The kind of commitment that opens up more scope for active democratic participation. You do not need to like Marx to use dialectics. And I do not want "to spit on Hegel." I would rather laugh about Musk, and all the techno-fixers who offer solutions to problems we do not even have, thereby distracting us from focusing on the "human centered" type of Digital Decade we want, and deserve. Perhaps Socrates can help us. He knew a thing or two about "democracy," and used his dialectics as a means to create a collective intellectual engagement, in pursuit of the common good. Socrates's dialectics has something in common with Resonance-empathy, because it requires "a willingness to *engage* with another world, life or idea."[1132] But creating a dialectic *engagement* is only the first step. Socrates also taught us that the *choices* we make matter for our democracy.

Thus, for the sake of women's empowerment and amusement in European democracies, I propose inventing an indicator which seriously considers women's knowledge, and values this knowledge as a fundamental pillar for the Digital Decade. A starting point could be: "how many women authors are quoted in policy-making documents." Policymakers will soon run out of women in STEM, and then they will be forced to read the works of historians, philosophers, sociologists, anthropologists, and perhaps even feminists. The indicator should ensure that they not only quote from this literature, but engage with it, and if they *choose* to discard its arguments, state why.

But this is only the start. For the sake of our collective empowerment, we need to create indicators that are informed not just by the European " feeling vs thinking," but also by the Balinese "feeling-thinking." The history and anthropology of emotions underline how the exclusion of women's knowledge from political debates has gone hand in hand with the denial of emotions' epistemic role. This process of parallel exclusion runs deep throughout the history of so-called "Western thought,"[1133] including the History of Technology.[1134] But the history of technology has also shown that emotions played a crucial role in shaping our Computer Age, for any gender. And any gender can learn and benefit by improving our awareness and our consideration of emotions. This is true for both academia and policymaking. There are no more excuses, then. We need to take emotions

1132Unni Wikan, "Beyond the Words: The Power of Resonance," *American Ethnologist* 19, no. 3 (1992): 460–82. (Italics in original text).

1133Like "the West vs the Rest" concept critically addressed in anthropology literature. Catherine A. Lutz and Lila Ed Abu-Lughod, *Language and the Politics of Emotion.* (Editions de la Maison des Sciences de l'Homme, 1990).

1134Ruth Oldenziel, *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945* (Amsterdam University Press, 1999).

seriously, for “without feeling we remain entangled in illusions,”[1135] as a wise Balinese professor-poet once said.

1135Wikan, “Beyond the Words.”

Epilogue

All watched over by humans of loving grace

On June 1, 1980, the city of Bologna hosted a free-entry concert by punk band The Clash. The concert was organized by the local Italian Communist Party section, which administered the city, in an attempt to bridge the profound divide with the grassroots left. Punks from every corner of Italy descended on Bologna for the occasion. The Bologna punx, however, did not accept the Communist Party's peace offer. The Clash were not enough to make amends for the PCI's betrayal of the grassroots left. Furthermore, the Bologna punx claimed, The Clash were sell-outs anyway, having signed contracts with major commercial labels. The protest did not succeed in turning other punks away from the concert. Sell-outs or not, they were still The Clash. But some thought the Bologna punx had raised a good point, and wanted to know more. After the concert, the Milan punx joined the Bologna punx in the anarchist space "Circolo Anarchico Berneri," where they spent the night discussing their experiences and producing a fanzine. The event was remembered by the Milan punx as an important moment for the growth of a political conscience within the group.[1136] Although not in the intended way, the Italian Communist Party had indeed fostered political ties among the youth.

In 2020, I am in the "Circolo Anarchico Berneri." I am sitting on the floor, going through old issues of the anarchist magazine *Volontá*. "Are you comfortable there? We can make space on a desk," someone asks. It is a tempting offer, but I am fine there. I am experiencing the "Italian historical sublime," that feeling of awe when you enter an archive and it is so full of magazines, books, leaflets, and posters that the floor is the only space where you can be. It is also the best spot to experience the sublime. I have a century of "anarchist imagination"[1137] at my disposal. And all I want to do, is to keep looking at these dusty books and magazines. Some punx would think I was terribly boring if they were here, but as I said: I am a killjoy, and "I am not willing to get over histories which are not over."[1138] However, I can't feel my legs anymore, because of all this sublime. I try to stretch between the piles of books around me, or at least change position. The historical sublime can be quite cumbersome. As I turn round, I notice a witty anarcho-dystopian warning, in the form of graffiti on a chair, hand-written with a black marker: "Berneri is watching you."

1136Marco Philopat, *Costretti a Sanguinare*, new edition (ShaKe, 2016). 51.
1137Carl Levy and Saul Newman, *The Anarchist Imagination: Anarchism Encounters the Humanities and the Social Sciences* (Routledge, 2019).
1138Sara Ahmed, *Living a Feminist Life* (Duke University Press, 2016).

I am amused, and comforted. Good that, for once, it is the anarchists who are appropriating George Orwell: at least they know what he was talking about. George Orwell's *1984* is indeed one of the most used literary references on the relationship between fear, technology, and politics. Or I should say: one of the most *abused* references. Everyone has appropriated Orwell, to promote things which Orwell would find loathsome: from multinational tech corporations,[1139] to far-right political parties with fascist nostalgia.[1140] The widespread appropriation of Orwell's *1984* shows the concerns he expressed in his book certainly struck a chord. But not all those who read Orwell established Resonance with his feeling-thoughts. To understand them, you have to know George Orwell's story. He was in Spain in the 1930s, like Camillo Berneri. Orwell was a member of the anti-Stalinist Marxist formation, while Berneri was in the anarcho-syndicalist group. Both were fighting for the socialist Republican faction in the Spanish Civil War (1936-39), against the fascist Nationalists. As we know, things did not end well for the Republicans.

"I am watching over everyone," wrote Camillo Berneri. It was the night of May 4, 1937 and "everything [was] quiet."[1141] He was in Spain, his comrades were asleep, and he finally had some time to write to his daughter Marie Louise. "[I am] working for those who will come. This is the only beautiful thing, really. More absolute than love, and more truthful than reality itself. What is a man without this feeling of duty, without this sentiment of being united with all those who have been, to the distant strangers, to those who will come?"[1142] The day before writing the letter, Camillo Berneri had delivered a public eulogy in memory of Antonio Gramsci, recently killed in Italy by the fascist regime.[1143] One day after writing the letter, Camillo Berneri was taken from his home in Barcelona by Stalinist troops. His body was found two days later, riddled with bullets.

1139See the famous 1984 Apple commercial: https://www.youtube.com/watch?v=VtvjbmoDx-I, accessed September 20, 2022.

1140Like the Italian right-wing party "Fratelli d'Italia." See: Giorgia Meloni, Twitter Post, July 13, 2021, 11:45 AM. https://twitter.com/giorgiameloni/status/1414883674282242062; Gianfranco Pasquino, "La Libertà e La Costituzione Spiegate a Giorgia Meloni (Che Non Le Conosce)," *Domani*, July 16, 2021, https://www.editorialedomani.it/idee/commenti/la-liberta-e-la-costituzione-spiegate-a-giorgia-meloni-che-non-le-conosce-b6fpx2kx; "L'inchiesta Di Fanpage Su Fratelli d'Italia a Milano," *Il Post*, October 1, 2021, https://www.ilpost.it/2021/10/01/fratelli-italia-milano-fanpage/. All webpages accessed September 20, 2022.

1141"Stanotte tutto è calmo" Camillo Berneri, "Camillo Berneri Alla Figlia Maria Luisa, Barcellona, 4 Maggio 1937," in *Pensieri e Battaglie* (Comitato C. Berneri, 1938).

1142"[…] Io veglio per tutti, lavorando per coloro che verranno. È l'unica cosa bella interamente. Più assoluta dell'amore e più vera della realtà stessa. Che cosa sarebbe l'uomo senza questo senso del dovere, senza questa commozione di sentirsi unito a coloro che furono, ai lontani ignoti, ai venturi?" Idem.

1143Camillo Berneri, "In Morte Di Antonio Gramsci," in *Scritti Scelti Di Camillo Berneri: Pietrogrado 1917, Barcellona 1937* (Sugar, 1964).

After the anarchists, also the anti-Stalinist Marxists in Spain received similar treatment. The Nationalists eventually won the Civil War. Nobody bothered too much: it was that period in European history when the liberals were more afraid of socialism than of fascism, and Churchill praised Mussolini. Eventually they realized their mistake, and after WWII, fascist regimes were finally eradicated from Europe: outside the Soviet influence, liberal democracies triumphed over the continent. Except for Spain, where the fascist government remained in power until 1975, when fascist dictator Francisco Franco died, of natural causes. And Greece, and Portugal. Italy also had unresolved problems with its fascist past, as we have seen.

The history of how fascist regimes emerged in Europe, and the blind eye liberal countries initially turned towards them, are part of George Orwell's *1984*, as much as the history of the horrific abuses committed by Stalin and other authoritarian Soviet leaders. Historians are well aware of this. However, it seems we are the only ones left who know this, besides some colleagues in the humanities and social sciences, and political activists. Otherwise, neither Big Tech nor the far-right would ever dream of quoting George Orwell, like they would never dream of quoting Gramsci or Malatesta.

I am telling this story because it is time to put on my mermaid's tail, and talk about the last type of Resonance which I hope you found in this dissertation: Resonance-empathy, which can be established between the readers of this work and the historical actors who populate its pages. This type of Resonance requires "a willingness to *engage* with another world, life or idea."[1144] The actors discussed here belonged to a broadly conceived, yet historically and culturally situated political tradition. But you do not need to be a socialist to establish Resonance-empathy with these historical actors. In fact, you don't even need to feel sympathetic about socialism: as the name says, *empathy* is what is needed. Establishing Resonance means looking for something which mattered to these actors, and might also matter to you.

George Orwell and Camillo Berneri, both also researchers,[1145] felt such a strong Resonance with other human beings, they went to fight a war with them. Today, fortunately, nobody expects such a life-changing commitment from a European researcher.[1146] This is a sign that a lot has improved in

1144Unni Wikan, "Beyond the Words: The Power of Resonance," *American Ethnologist* 19, no. 3 (1992): 460–82. (Italics in original text).

1145Orwell was also an essayist and a journalist, not only a novelist. Camillo Berneri taught philosophy at the University of Camerino before having to leave Italy because of the fascist regime.

1146This epilogue was written before Russia's invasion of Ukraine in late February 2022, which is still unfolding. I have not altered my text, but add this note to acknowledge that some European colleagues are currently involved in

our societies. But we have just been experiencing a global pandemic. I found the widespread use of "war" metaphors during the pandemic problematic, and want to avoid this parallelism. However, as far as emotions are concerned, a pandemic and a war (and any large-scale catastrophic event) are certainly similar in that many people experience emotions that were not part of their daily lives before that event. Sometimes, these new emotions make those who experience them ask new questions, and perform new practices.

During the Covid-19 pandemic, many of these "new questions" and "new practices" were directed against the knowledge and recommendations provided by the global expert community. And I am not only referring to anti-lockdown rioters: some governments and enterprises also discarded the experts' knowledge. I think this situation calls for further engagement by us, the experts, with civic society. And it calls for an engagement which is not mediated by other societal actors and institutions. It is fundamental that academia can partner with governments and enterprises if it wants to be relevant *within society*. But it is equally fundamental that academia remains relevant *for society,* because of its unique role as an independent knowledge institution. I think that academia's role is not only to solve societal issues, but also to raise these issues. However, it seems contemporary academia spends a lot of energy *proving* to other institutions that our jobs are socially meaningful, which takes away time from *making* our job socially meaningful.

Many historical actors in this dissertation were researchers, either in academia or independently. They were very committed in exploring multiple ways and sites to establish a direct engagement with society. And their role proved to be fundamental in countering the "crisis of experts' knowledge" which was also an issue in the 1970s. They showed that "experts" were aware of the expertise issues, and were willing and ready to discuss these also outside their laboratories and specialized conferences. Furthermore, these experts not only sought a space to share their knowledge with society, but also a space where they could learn from other societal actors. In other words, they sought to establish Resonance-empathy.

For my academic readers, my wish is that you have been able to establish some Resonance-empathy with your colleagues from the past. And that this will lead you to commit, in any way you can, to carving out new spaces in which we, as an academic community, can establish unmediated Resonance with society today, independently from other institutions. Some of you might already have that Resonance, and be working to carve out these spaces. If that is the case, then my hope is

an armed conflict.

that this dissertation has enriched, or reinvigorated, the commitment you made, or perhaps will now make. I feel-think that these independent spaces will be sorely needed in the future Computer Age, which will also be a post-pandemic age. I feel-think this way because of the research I have carried out on the unfolding of the past Computer Age, in a time when I was not yet around; and because of my experiences as a feeling subject in the present Computer Age.

One final statement: because I am an interdisciplinary mermaid, my anthropologist half requires me to "return" my research results to the actors who were part of my research.[1147] I do not have a specific community of living people to address, as a "pure" anthropologist would have, therefore I speak broadly to those who have a shared political history (socialism) with those actors. Some readers might have established Resonance-empathy with historical actors because of their political values. I am happy for you: I appreciate that the mixture of socialist traditions I have put side by side might be hard for some people to take on board. My hope is that this book has helped establish some Resonance-empathy you thought you did not have, or had forgotten. In particular, I hope that this book leads you to take the Digital Age seriously, both from a macro-political and micro-political perspective. To encourage this, I would like to suggest three points to think about.

One: the "Principle of Hopeful Curiosity" might help those struggling with "Left-Wing Melancholia," as defined by Enzo Traverso.[1148] This notion is associated with the centrality of memory that shaped 20th century socialist (Marxist) culture. Traverso underlines how the turn of the 21st century marked a shift from "the Principle of Hope"[1149] to "the Principle of Responsibility."[1150] In Traverso's view, the new centrality of memory could consolidate socialism's history as a "history of ruins," by stressing narratives of defeat, a key component in socialist memory. Or, it could foster a new socialist imagination able to recover the importance of a hopeful and radical utopian thinking. Although Traverso discusses Marxist culture, I think anarchists might also find his book Resonant. And, for both Marxists and anarchists, historically the Principle of Hopeful Curiosity has been a powerful Resonant concept, bringing socialists together to craft new political imaginaries and practices. Perhaps it can help shake off melancholy today.

1147This is a pillar of anthropological research. See the Italian Association for Applied Anthropology's deontological code: https://www.siacantropologia.it/codice-etico/, accessed September 20, 2022.
1148Enzo Traverso, *Left-Wing Melancholia. Marxism, History, and Memory* (Columbia University Press, 2016).
1149Ernst Bloch, *The Principle of Hope* (MIT Press, 1986).
1150Hans Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (University of Chicago Press, 1985).

Two: whenever you feel “Big Brother is watching you,” also remember that “Camillo Berneri is watching *over* you.” Which means: new ways are constantly being invented to defy and re-purpose technologies. Sometimes, the left likes to present gloomy narratives on the consequences of technological development, and these narratives can be very coherent and well argued. History has proved that many of these analyses were right. But they have a common fault: they often fail to see what is being done to address technology misuses. Thus, the gloomy comrades could join the melancholic comrades in trying to establish some Resonance through the Principle of Hopeful Curiosity. They will discover that many “barefoot engineers”[1151] and “barefoot hackers” have been watching over them all the time.

Three: socialists should join academics in taking emotions more seriously. You see it in every family: some people use their own emotions to justify not enquiring why others have different emotions. Other people reproduce rational/emotional dichotomies, in order to not engage intellectually with new perspectives (even more so based on gender).[1152] In both cases, emotions are used as an excuse for intellectual laziness and political disengagement. The “refusal of intellectual work” has nothing to do with the Autonomist Marxists’ “refusal of work”: it does not weaken capitalism, but mostly weakens those who practice it.[1153]

Are there others you can try to establish Resonance with, to help think about these points? Besides women, historians, and anthropologists, poets are another category of experts on emotions. Poets also have a lot to say about technology. In fact, the first Italian hacker was a poet. In the early 1960s, left-wing intellectual Nanni Balestrini[1154] was involved in an unusual project with IBM: making poetry with a computer.[1155] Balestrini, with the help of computer expert Alberto Nobis, created software that combined verses from three different poems to compile a new poem,

1151A/traverso, “La Rivoluzione Non è Clandestina,” April 7, 1977.

1152Erica Lagalisse, *Occult Features of Anarchism: With Attention to the Conspiracy of Kings and the Conspiracy of the Peoples* (PM Press, 2019).

1153For a feminist and post-colonialist debate on intellectual work, politics, and imagination, see: Angela Davis and Gayatri Spivak, “Planetary Utopias,” ed. Nikita Dhawan (Planetary Utopias: Hope, Desire and Imaginaries in a Postcolonial World, Akademie der Künste, Berlin, 2018), https://www.radicalphilosophy.com/article/planetary-utopias, accessed September 20, 2022.

1154Nanni Balestrini was a leftist intellectual and writer, close to the Autonomia, one of the main “storytellers” of the extra-parliamentary left. Nanni Balestrini and Primo Moroni, *L’orda d’oro: 1968-1977: La Grande Ondata Rivoluzionaria e Creativa, Politica Ed Esistenziale* (Feltrinelli Editore, 1997).

1155See: Nanni Balestrini, “Tape Mark I,” in *Almanacco Letterario Bompiani* (Bompiani, 1962), 145–51; Nanni Balestrini, “Tape Mark II,” in *Come Si Agisce* (Feltrinelli, 1963), 213–30; Roberta Iadevaia, “(Ghosts of) Generative Literature in Italy between Past, Present and Future,” *MATLIT: Materialidades Da Literatura* 6, no. 1 (2018): 85–105. Cultural organization “Museo dell’Informatica Funzionante” reproduced Balestrini’s experiment in the 2010s. Their work is documented, in English and Italian, including an interview with Balestrini, in: “TAPE MARK 1, Nanni Balestrini: Research and Historical Reconstruction” (Museo dell’Informatica Funzionante, 2017), https://museo.freaknet.org/en/tape-mark-1-nanni-balestrini-ricerca-ricostruzione-storica/.

processed by a computer.[1156] The project, and the resulting poem, were called “Tape Mark I”. Balestrini certainly demonstrated that it was possible to “create art and beauty on a computer.”[1157] After all, history of computing icon Ada Lovelace[1158] was a poet’s daughter, and she famously claimed: “I shall in due time be a poet.”[1159] The importance of poetry in making machines more beautiful is also what Marie Louise Berneri suggests in her book on Utopia, by claiming that: “Utopias have often been the plans of societies functioning mechanically, dead structures conceived by economists, politicians, and moralists; but they have also been the living dreams of poets.”[1160] Also Radio Alice co-founder, Franco “Bifo” Berardi has become very fond of poetry in the past decade, suggesting it is a key tool to overcome the “depression, panic, unhappiness, anxiety, fear, terror” that characterize the contemporary age.[1161] Bifo also published a “Manifesto of Post-Futurism,”[1162] based on a *détournement* of Tommaso Marinetti’s *Manifesto del Futurisimo* (Futurist Manifesto, 1909), the manifesto “that introduced the century that believed in the future.”[1163] But Bifo was not the first to realize something was wrong with Futurism and its promises of speed, technology, power, and toxic masculinities (perhaps the very first instance of the Black Box Entanglement?).

I end this dissertation by returning to women’s knowledge. To a woman who was there at the time of Futurism, and eventually realized how disappointing it was.[1164] Perhaps her words will help with those Digital Decade indicators, or to find the Principle of Hopeful Curiosity, or maybe she will just create some Resonance-empathy. Enter Mina Loy, and she says:[1165]

1156The three verses were from: Michihito Hachiya’s *Hiroshima Diary*; Paul Goldwin’s *The Mystery of the Elevator*; Lao Tzu’s *Tao Te Ching.*

1157Steven Levy, *Hackers: Heroes of the Computer Revolution* (Anchor Press/Doubleday, 1984).

1158Lovelace certainly had an enormous influence in both popular culture (as inspirational role model for women in tech) and academia (because of controversies about her work): in this sense, she is an “icon” in the History of Computing.

1159Imogen Forbes-Macphail, “‘I Shall in Due Time Be a Poet’: Ada Lovelace’s Poetical Science in Its Literary Context,” ed. Robin Hammerman and Andrew L. Russell, *Ada’s Legacy: Cultures of Computing from the Victorian to the Digital Age*, 2016, 143–68.

1160Marie Louise Berneri, *Journey Through Utopia* (Routledge & Kegan Paul, 1950). 581.

1161Franco Berardi, *After the Future* (AK press, 2011). 5.

1162Franco Berardi, “The Post-Futurist Manifesto,” 2009, https://www.generation-online.org/p/fp_bifo5.htm, accessed September 20, 2022..

1163Berardi, *After the Future*. 128.

1164Ruth Oldenziel, *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945* (Amsterdam University Press, 1999). 147; Natalya Lusty, “Sexing the Manifesto: Mina Loy, Feminism and Futurism,” *Women: A Cultural Review* 19, no. 3 (2008): 245–60.

1165Mina Loy, “Aphorisms on Futurism,” 1914. https://www.poetryfoundation.org/articles/69405/aphorisms-on-futurism , accessed September 20, 2022.

LOVE the hideous in order to find the sublime core of it.

OPEN your arms to the dilapidated; rehabilitate them.

YOU prefer to observe the past on which your eyes are already opened.

BUT the Future is only dark from the outside.

Leap *into it—and it will EXPLODE with* Light.

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